8 SEPTEMBER 1955

ONE SHILLING

ELECTRICAL TIMES

DIRECT-ON STARTERS

DELIVERY FROM STOCK

IN STANDARD SIZES

½, ¾, 1, 2, 3, 5, and 7½ BHP, 380/440 Volts

Available also for non-standard voltages.

Brochure S.205 available on Request

ESTABLISHED 1882

THE ELECTRIC CONSTRUCTION COMPANY LTD.

TELEGRAMS ELECTRIC WOLVERHAMPTON

Head Office and Works: BUSHBURY ENGINEERING WORKS WOLVERHAMPTON ENGLAND

TELEPHONE WOLVERHAMPTON 21455 (7 LINES)

2660

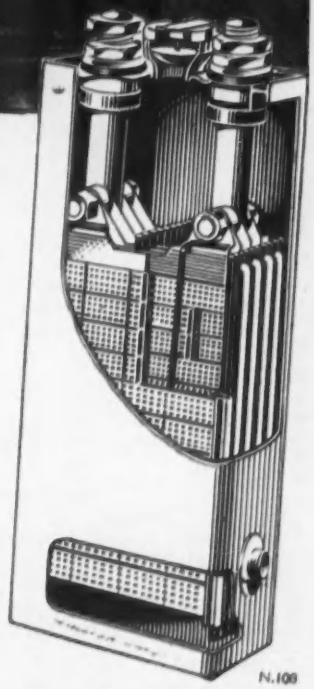
Manufacturers of Rotating Electrical Machinery, Switch and Control Gear, Rectifiers and Transformers.

Which battery is built like the King George V?

Its name is Nife! This exceptionally tough battery is also made of steel and like the King George V is built to last—to withstand shock and vibration and to stand up to severe mechanical conditions. Unlike this giant locomotive, however, a Nife battery is small and compact, takes up very little room and requires virtually no maintenance. Also a Nife battery withstands the heaviest discharge, is free from self-discharge and is unaffected by idleness in any state of charge. *It repays its original cost many times over!*

These are the reasons why so many electrical engineers rely on Nife Batteries for:

SWITCH CLOSING · SWITCH TRIPPING · EMERGENCY LIGHTING
STANDBY POWER FOR AUXILIARIES AND CONTROL CIRCUITS
SEARCHLIGHT AND INSPECTION SETS · DIESEL ENGINE STARTING
PORTABLE SAFETY LAMPS · TELECOMMUNICATIONS
BATTERY ELECTRIC TRUCKS AND LOCOS



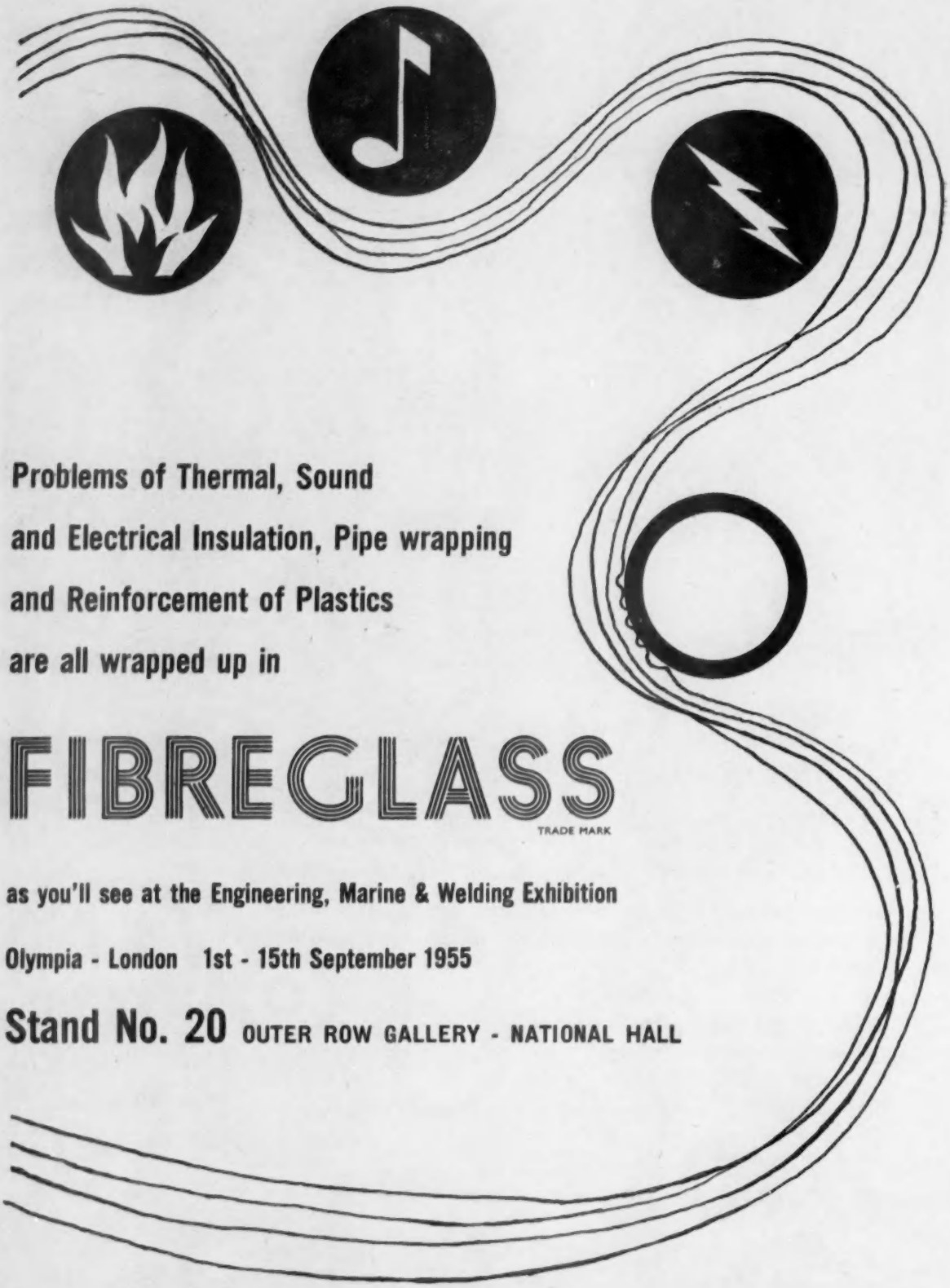
N.100

Its name is NIFE

—THE **STEEL** ALKALINE BATTERY

Nife Batteries · Redditch · Worcestershire

A



Problems of Thermal, Sound
and Electrical Insulation, Pipe wrapping
and Reinforcement of Plastics
are all wrapped up in

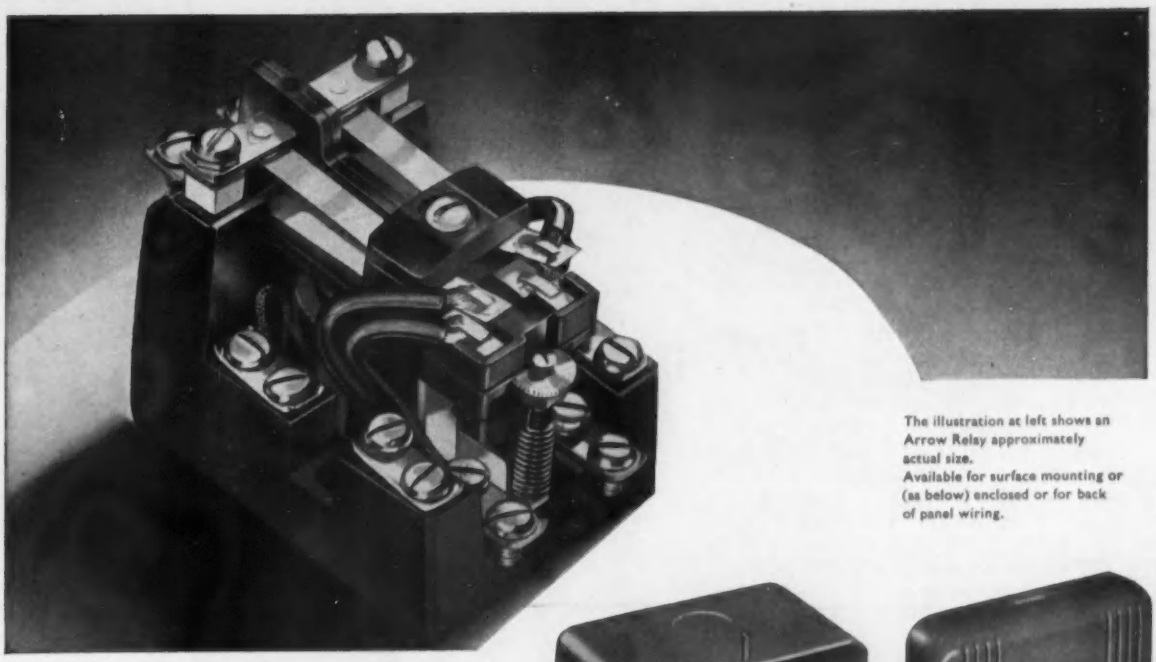
FIBREGLASS
TRADE MARK

as you'll see at the Engineering, Marine & Welding Exhibition

Olympia - London 1st - 15th September 1955

Stand No. 20 OUTER ROW GALLERY - NATIONAL HALL

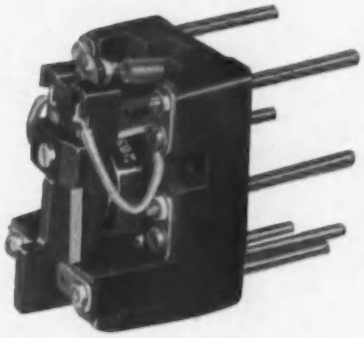
FIBREGLASS LTD · RAVENHEAD · ST. HELENS · LANCS · TEL: ST. HELENS 4224



The illustration at left shows an Arrow Relay approximately actual size.
Available for surface mounting or (as below) enclosed or for back of panel wiring.

Relays for long and silent service . . .

Made by skilled craftsmen from first-quality materials, Arrow Relays, like all Arrow products, are individually produced; they are designed and built to ensure exceptionally long and silent service. Essentially compact, no less than thirty different circuit arrangements are available on the standard base. Silver-to-silver butt type contacts give continuous rating up to 10 amps per pole at 230 volts AC. Operating coils, of low wattage consumption and continuously rated, are available for 6 to 550 volts AC and 6 to 230 volts DC.



ARROW

SEND FOR NEW CATALOGUE MS9

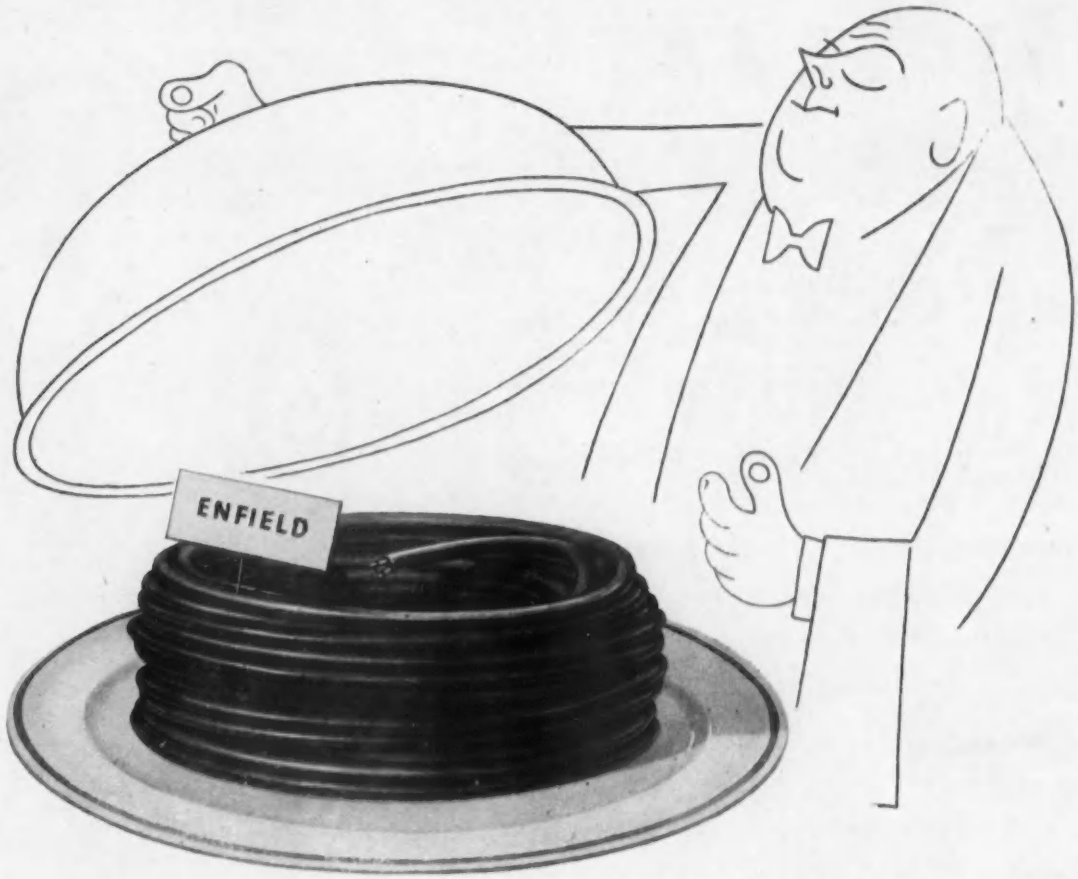
ARROW ELECTRIC SWITCHES LTD · HANGER LANE · LONDON · W5

Constantly handled...

CRESSALL Rheostats and Potentiometers are designed and constructed to withstand the constant handling made necessary by the heavy demands of modern industry. In the assembly of delicate components this calls for quality control in a high degree. CRESSALL methods of manufacture are based on forty years' experience—a guarantee of constant service and dependability under the most exacting conditions. Whatever *your* requirement, there is a CRESSALL component to meet every need in the whole power range.

CRESSALL

THE CRESSALL MANUFACTURING CO. LTD. · TOWER STREET · BIRMINGHAM 19
TELEPHONE: ASTON CROSS 2666 (3 LINES) · TELEGRAMS: "OHMIC, BIRMINGHAM"



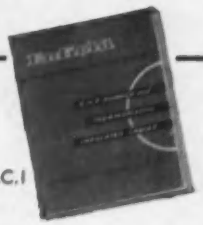
An important dish on our menu

We, of course, are at the serving end—and the way those miles and miles of Rubber and Thermoplastic Insulated Cables are swallowed up by hungry customers is a constant source of wonder. Mind you, we go to exceptional lengths to ensure that every yard of cable we make, more than complies with the accepted BS.7: 1953 standards. To this end Enfield Cables have a 'pilot' plant laid out to produce rubber compounds and lengths of cable independently of the main factory. This plant is equipped with every known device for experimentation and testing of the finished cable under the most severe practical conditions.

When the Enfield 'backroom boys' are satisfied, and not before, that particular type of cable goes into general production. And be sure it is then something of which Enfield can be proud.

ENFIELD CABLES

C.M.A. RUBBER & THERMOPLASTIC INSULATED

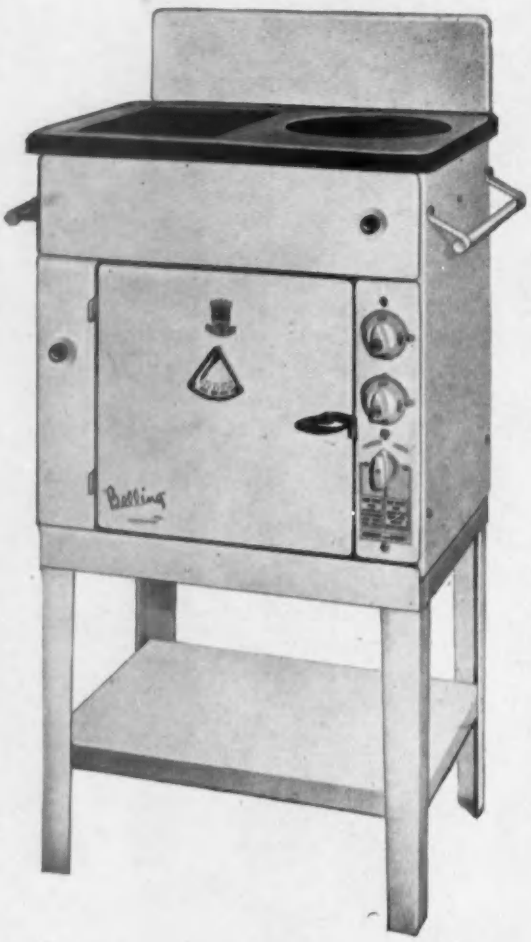


Our Catalogue EN.103 gives full details of the various types, grades, cores and finishes available. May we send you a copy?

ENFIELD CABLES LIMITED, VICTORIA HOUSE, SOUTHAMPTON ROW, LONDON, W.C.1
Telephone: HOLborn 9292 (London Office) · Telephone: HOWard 2661 (Works)

E.40

BIG BABY "BELLING" sales ahead



There will certainly be very big Big Baby Belling sales ahead. Production on our new assembly lines is rapidly increasing and the delivery position is getting better and better. The demand for the Big Baby has exceeded all expectations. No wonder—it has the cooking capacity of a full size cooker yet will work off any power point * and costs only £19.17.6d. The independently heated oven produces roasting and baking that's second to none in its class. In fact the results from this splendid cooker compare favourably with any cooker at any price.

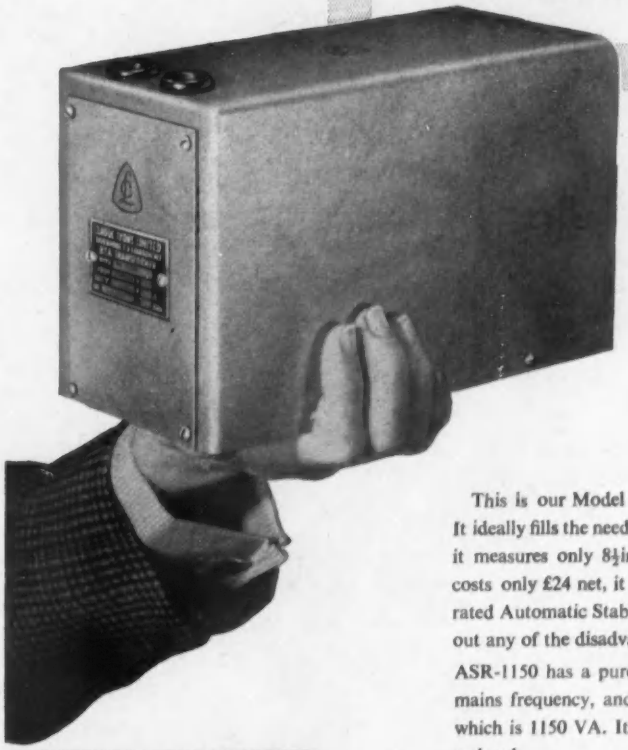
* *Patent interlocking device limits current automatically so that the cooker can be safely operated from a 13 amp power point.*
- *Large independent extra quick heating oven. Oven is ready for use in 15 mins.*
- *8" solid type boiling plate and combined grill-boiler.*
- *Large hotcupboard for plates and food.*
- *Useful plate warming compartment beside oven.*
- *Supplied on Stand with utensil shelf.*
- *Handy Towel Rail on either side of oven is included in the price.*
- *£19 · 17 · 6 including Stand—subject to usual Baby Belling discounts.*

you can't beat a "Belling"

Belling & Co. Ltd. Bridge Works. Enfield. Middx. Howard 1212

CBC 430

A NEW-PRINCIPLE A-C AUTOMATIC VOLTAGE STABILISER



This is our Model ASR-1150 Automatic Voltage Step Regulator. It ideally fills the need for a cheap, small and light Stabiliser. Although it measures only 8½in. x 4½in. x 5in., weighs as little as 11 lbs., and costs only £24 net, it has a performance fully equal to any similarly rated Automatic Stabiliser of the resonated, saturated core type, without any of the disadvantages.

ASR-1150 has a pure output waveform, is unaffected by changes in mains frequency, and works equally well from no-load to full load, which is 1150 VA. It has a stabilised output at 230V unless otherwise ordered.

Many other Automatic Voltage Stabilisers are now manufactured by us, and all are available for immediate delivery. In some cases the constancy of output is as high as 0.15%. Models are available from 200 VA to 30 kVA, single phase. 3-Phase Stabilisers are also available. Prices are *extremely* competitive.

We can supply from stock all types of American tubes, condensers, valves, potentiometers, etc.

★ *MEMO: If you are interested in infinitely-variable Transformers, do not forget the almost indispensable "VARIAC" (Reg'd. Trademark). Models are available from 170 VA to 21 kVA. Our Catalogue V-549 (3rd Edition) tells the whole story, and will gladly be mailed free and post free, on request.*

The *NEW "ASR-1150"* costs only *£24* net

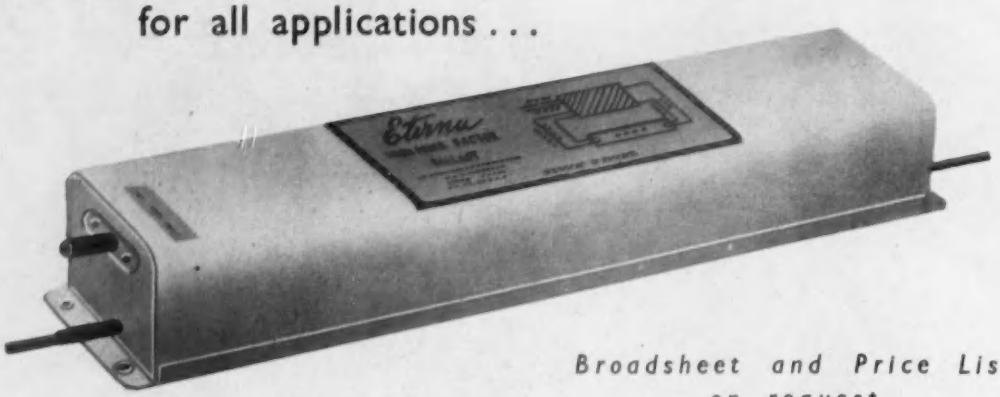
Complete information is obtainable from:

CLAUDE LYONS LTD., *Electrical and Radio Laboratory Apparatus etc.,*
Head Office and Works: 76, OLDHALL STREET, LIVERPOOL 3, LANCS.
SOUTHERN FACTORY: VALLEY WORKS, WARE ROAD, HODDESDON, HERTS)
(A.10 main London Cambridge Road, at junction of A.602.

ETERNA

FLUORESCENT CONTROL GEAR

for all applications . . .



Broadsheet and Price List on request

ENSEL ELECTRIC Co., Ltd.,

218-219 UPPER STREET, LONDON, N.1

Telephone : Canonbury 2251/2

SPENCERS story starts to take shape!

Three feet make a mile !

● This picture shows the process where SPENCER wire is drawn—where the wire passes through a succession of dies as it increases in length relatively to the decrease in its thickness. With steel wire, particularly, this involves a series of difficult problems—solved by the use of machinery as complex as it is efficient.

● *Manufacturers of High Carbon Steel Wire, Mild Steel Wire, Copper Wire and Aluminium Wire.*

Telephone: WAKEFIELD 3671 (6 lines)
Telegrams: SPENCER, TELEX, WAKEFIELD, 55.200

FOR OVER FIFTY YEARS WIRE MANUFACTURERS TO INDUSTRY

Spencers OF WAKEFIELD

R.E.A.L.

AND NOW - another record PLINTH sales season...

WITH A PERFECT WRAP IN A PERFECT PACK TO HELP YOU!

Each R.E.A.L. Plinth is proofed against moisture and dust by a pleated cellophane wrap that permits full inspection and handling before purchase, and maintains the immaculate condition of the Plinth itself. Now the standard method of dispatch, these rail certified containers hold 12 Plinths of a size, in a colour assortment that mirrors the public demand: 6 Pastel Cream, 2 Gilt Lustre, 2 Eggshell Black, 1 Pastel Rose and 1 Pastel Blue. This is our recommended assortment but, of course, any selection can be supplied. Broken quantities carriage extra, plus part cost of packing.

The R.E.A.L. Plinth
List No. 5000 **36/9d.** each including P.T.

The Junior Plinth
List No. 5002 **28/-** each including P.T.

Patent No. 659,876

Specially appointed distributors are carrying stocks in every part of the Country.

NATIONAL ADVERTISING

Watch for our announcements in these journals

ESQUIRE
EVERYBODY'S
FINANCIAL TIMES
HARPER'S BAZAAR
HOMES & GARDENS
HOUSEWIFE
IDEAL HOME
JOHN BULL
THE LADY
PICTURE POST
PUNCH
RADIO TIMES
TIT BITS
T.V. MIRROR

and many National Daily Papers.

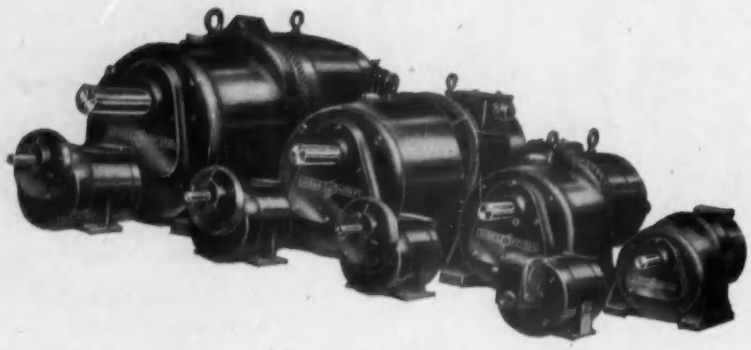
Issued by Rowlands Electrical Accessories Ltd., R.E.A.L. Works, BIRMINGHAM 18

TRADE + MARK −

HIGGS MOTORS LTD.

MANAGING DIRECTOR DAVID C.Y. HIGGS, A.M.I.E.E.

BIRMINGHAM 6 ENGLAND

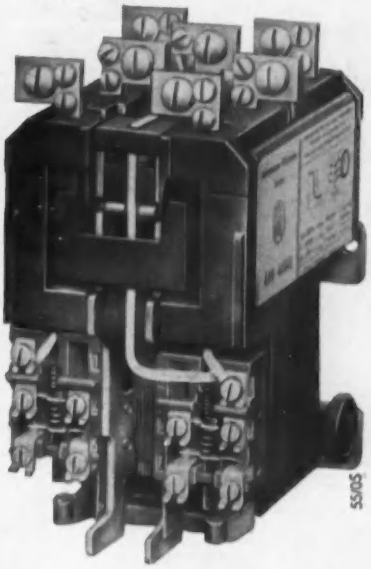


A.C. and D.C. GEARED MOTORS

GUARANTEED FOR EVER

Belfast · Bristol · Cardiff · Dundee · Glasgow · Hull · Leeds · Liverpool
London · Manchester · Newcastle · Peterborough · Sheffield · Wolverhampton

Contactor DIL 4/52
with a contact life of
ten million cycles of operations
with a motor output of 15 HP at
380/500 V and of
three million cycles of operations
with a motor output of 30 HP at
380/500 V



Contactors with Machine Life Span

Electrical controlgear is an integral part of modern production machines.
Messrs. Klöckner-Moeller are the only manufacturers in this line whose controlgear has a life equal to that of the machine it controls, meaning no maintenance nor exchange of contacts.
This signifies at least 10 years of trouble-free service and in consequence a considerable saving of unproductive costs for repairs and dead periods.
We invite your requests for detailed descriptions of this economic gear.

Original
KLÖCKNER-MOELLER · BONN

Representatives: Messrs. W. R. VAUGHAN LIMITED
Industrial Representatives
4 Queen Street · Curzon Street
LONDON W 1
Telephone GROsvenor 1571-2

Make a note to visit our STAND No. 15
Outer Row Gallery, National Hall.

Daytime Heating...

is cheaper at night!

Panelec Embedded Electric Low Temperature Radiant Floor Warming provides efficient heating at a cost which is always comparable with, and often less than any available alternative form of heating ...

- *Consumes current only at night, taking full advantage of OFF-PEAK tariff.*
- *Saves space and simplifies building design.*
- *Reduces dust-carrying convection currents and banishes "Cold spots."*
- *Extends the life of furnishings and interior decorations.*
- *It is clean, healthy, safe and automatic—providing constant temperature control irrespective of external conditions.*

There are many applications of the Panelec Floor Warming System. If you have a heating problem, the chances are that Panelec can provide an effective and economical answer. Why not investigate the possibilities of using Panelec?—write for publication No. PAN.655D or discuss the matter with Panelec Technical Advisory Service. Our engineers will be pleased to help you.

REGISTERED "Panelec" TRADE MARK

N.B. "Panelec" is the original, registered trade name for this patented warming system, and can only be obtained from the address, shown here.

PANELEC (GREAT BRITAIN) LTD · 27 Hatchlands Road, Redhill, Surrey
Telephone: REDHILL 3461 (5 lines) PBX · Telegrams: MURELEC, REDHILL

THE INSTRUMENT MODEL

Specially designed for soldering operations in the compact assemblies used in present day radio, television and electronic industries.

Weight 3¼ oz. (excluding flexible).

Length 9 in. 25 watts.

Voltage Range 12, 24, 50, 100/110, 120/130, 200/220 and 220/240

Interesting features

(1) Bit ⅛" diameter, simple to replace.

(2) Steel cased element, also replaceable.

(3) Detachable hook for suspending iron when not in use.

(4) Moulded two part handle, remains cool in use.

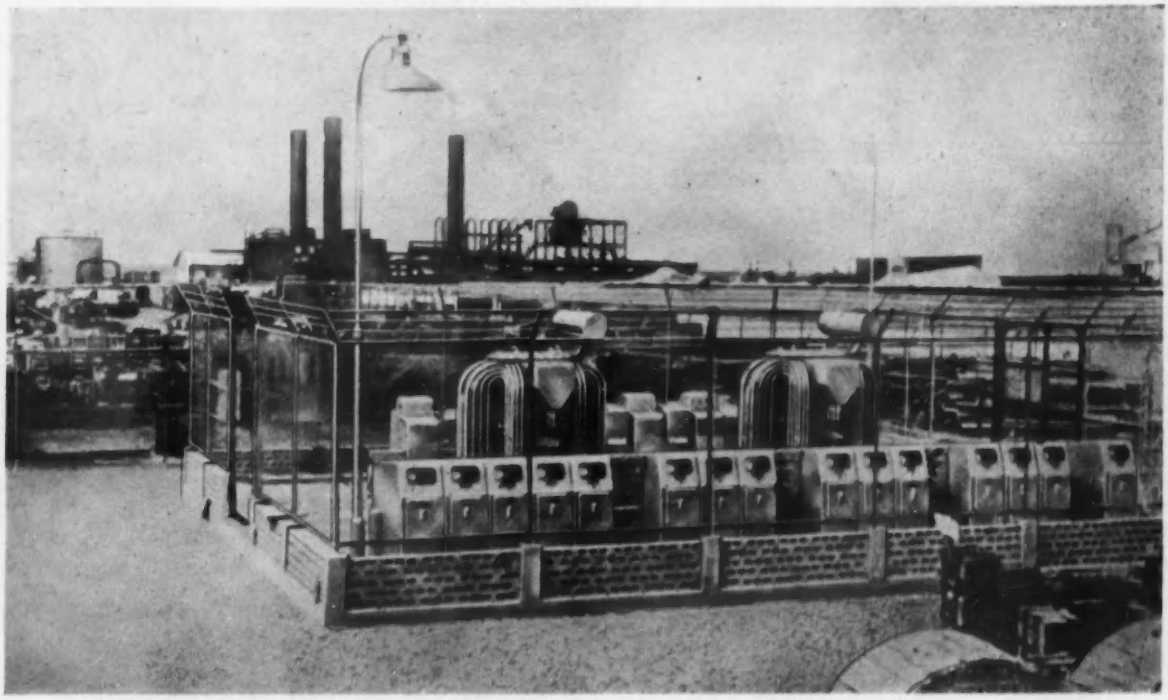
(5) 6 ft. Henley Flexible.

HENLEY SOLON TRADE MARK
ELECTRIC SOLDERING IRONS

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD.
51-53 Hatton Garden, London, E.C.1

CUT OUT BUILDING COSTS

—by installing Outdoor IVIO Switchgear Units



Outdoor Transformer Substation in important Oil Refinery incorporating 11kV. 150 MVA and 440 v. 25 MVA IVIO Metalclad switchgear units. This illustration is typical of many such installations in various parts of the world.

★

We are acknowledged as the pioneers of outdoor switchgear installations of this character. The quality and performance of IVIO switchgear is the result of over ten years of service experience in the most severe climatic conditions at home and abroad.

YORKSHIRE SWITCHGEAR & ENG. CO. LTD.

LEEDS —— LONDON

Associated with ELECTRO MECHANICAL MNFG. CO. LTD., SCARBOROUGH

maintaining service and safety

at London Airport

Standing by in case of a mains failure and a consequent disastrous break in runway lighting, the nine emergency generating sets at London Airport are controlled by Electro-Dynamic Switchboards and Panels. Sure proof of the trust placed in this outstanding control gear.
The panels include audible, local, and remote visible alarm indicators for such emergencies as alternator overloading and engine failure.
They also include change-over switch to enable either manual or automatic voltage control of the alternators, test switches to simulate mains failure, and indications of the loads supplied from the mains and from the generating plant.

A control panel, 75 kVA, 3-phase, 50 c.p.s. Apertures provided for diesel control.

Energy shaped to industry

ELECTRO DYNAMIC CONSTRUCTION CO LTD

ST. MARY CRAY · KENT

Tel: ORPINGTON 27551. Grams: "ELEDAMIC, ST. MARY CRAY"

Control Gear Works: Bridgwater, Somerset. Tel: Bridgwater 2882. Glasgow Office: 40 Houldsworth St., C.3. Tel: Central 2620

The supply of power to industry . . .

Since 1895 . . . The Supply of Power to Industry by electricity has depended upon the safe and enduring qualities of the electric cables. Well known to engineers for their superb performance and reliability CONNOLLYS' Paper Insulated Power Cables have "grown-up" with the mighty giant of Electric Power. Many Area Electricity Boards, Collieries and Railways rely on CONNOLLYS' Cables knowing that in our modern factory we, ourselves, carry through every stage of manufacture from wire-drawing, to final testing.

CONNOLLYS' Paper Insulated Power Cables are produced to British Standards and other specifications from 660 to 11,000 volts. Special finishes can be manufactured to customers' own requirements.

CONNOLLYS (BLACKLEY) LIMITED

Founder members of the C.M.A.

HEAD OFFICE: MANCHESTER 9

Phone: CHEetham Hill 1801 **Grams: "Connollys Blackley"**

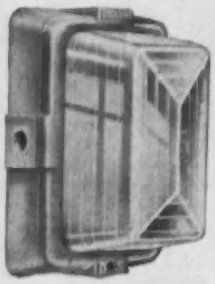
Southern Sales Office and Stores :
23 Starcross Street, London, N.W.1
Tel : EUSton 6122

Birmingham Office :
15-17 Spiceal Street, BIRMINGHAM 5
Tel : Midland 2268

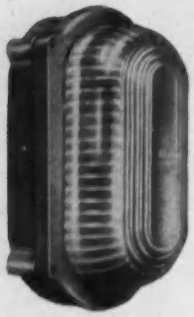
DORMAN

CONTROLLED DISTRIBUTION LIGHTING UNITS

HIGH QUALITY PRISMATIC LIGHTING TO SUIT ALL SITUATIONS

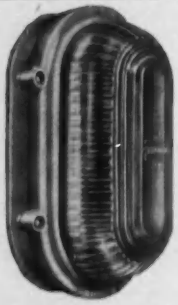


The DIOLUME is a de luxe architectural fitting, diecast in non-corroding silicon alloy. The four conduit holes are conveniently positioned for easy wiring.



The DIOPAL is diecast in high quality silicon aluminium alloy (L.33) with opalescent prismatic glass for wide light dispersion.

The SAFETY DIOLUX has non-splintering perspex closure to prevent broken glass. High light transmission with non-inflammable bonding.



The DIOLUX with chromium plated reflector and special glass for all angle maximum light. Used in H.M.Y. "Britannia" and R.M.S. "Southern Cross". Rust, dust and waterproof. "Dioprism" bulkhead fittings have recently been installed on S.S. "Ivernia."

PERFECTION OF LIGHT DISPERSION

★ *Write to Lighting Division for full details and advice*

Dorman & Smith Ltd.
MANCHESTER 5

Also at London, Glasgow and Belfast

HEAT PRESERVATION BY EETO

C.W. 1987/143a

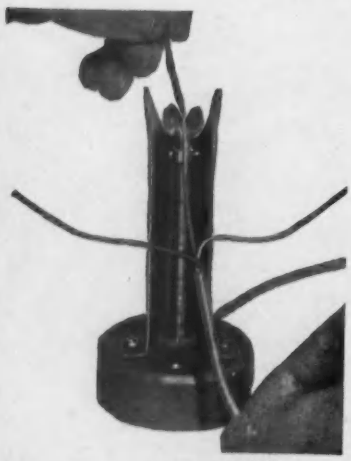
CYLINDER JACKETS

The ORIGINAL sectional Cylinder and Tank jacket, as used and recommended by almost every Municipal Undertaking in the Kingdom. There is no substitute.

EETO Service is prompt and efficient.

EETO INSULATIONS
River St., Bolton, Lancs.
Tel.: BOLTON 3764

DON'T NICK IT— *STRIP IT*



PRESERVE ALL YOUR CONDUCTORS

REMOVES P.V.C. & POLYTHENE INSULATION UP TO ⅜" DIAMETER QUICKLY & CLEANLY

READILY FIXED TO BENCH OR WALL

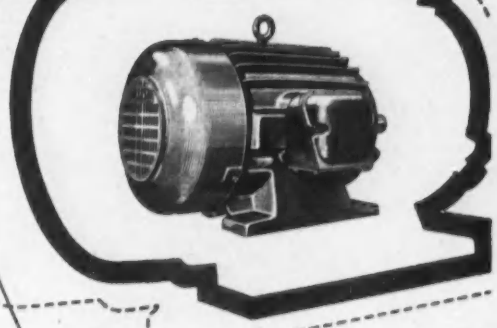
SUPPLIED FOR ALL VOLT RANGES

Reg. Design 871264
ILLUSTRATED LIST No. 74 *PORTABLE TYPE LIST No. 76*
SOLE MANUFACTURERS & SUPPLIERS
PVC & POLYTHENE ELECTRIC CABLE STRIPPERS

ADCOLA (Regd. Trade Mark)
SOLDERING INSTRUMENTS & EQUIPMENT

ADCOLA PRODUCTS LTD.
GAUDEN ROAD
CLAPHAM HIGH STREET, S.W.4
Phone:
MACAULAY 4272

SMALL MOTORS Big range



The Brush factory at Cardiff specialises in small motors – and quick service. From 1 h.p. fly weights to middle weights with 80 h.p. on the shaft, you get exactly what you want from Brush. Practically every type of small motor is immediately available. For driving fan and pumping sets, compressors, machine tools, conveyor belts, quarry equipment, paint mixers, grinding mills, textile machinery and an infinite variety of other industrial applications. Brush small motors can be supplied to conform to BSI, CSA or NEMA standards.

You get **exactly** what you want...from **BRUSH**

BRUSH ELECTRICAL ENGINEERING CO. LTD., HOPKINSON WORKS, CARDIFF · MEMBER OF THE BRUSH GROUP

Agriculture and the Balance of Power

BRITISH FARMERS ARE PRODUCING MORE FOOD—more efficiently. They are using less labour—more productively. They are using *more electricity.*

Electricity pumps water, hoists loads, dries crops, helps to light the cowsheds, milk the cows and keep the milk cool and fresh. Electricity is the perfect farm worker, available at any time of the day or night.

The farmer's wife, too, is using more electricity, to give her comforts and convenience never before available in the country. All this is very fine for the farmer and his wife. But how about the other consumers who want electricity? It's a very good thing for them too. Why?

It's a matter of balance. Different jobs need electricity at different times of the day and night. These varied demands help to even out the load on the power stations. When generating plant is continuously operated the price of electricity is kept low. All users benefit, therefore, the more widely electricity is used, for more and more purposes.

7 YEARS' PROGRESS

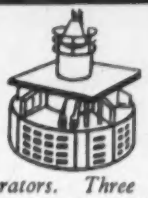
47 NEW POWER STATIONS

10,000,000 ADDITIONAL HORSEPOWER INSTALLED

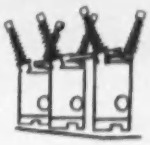
Los Peares Hydro-Electric Power Station

ANOTHER B T-H INSTALLATION

All over the world BTH hydro-electric equipment is helping to harness natural resources—helping to produce power and prosperity. In Spain, BTH (as main contractors) equipped completely the Los Peares hydro-electric power station.

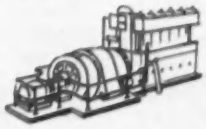


Generators. Three 62,400 kVA sets with Boving Francis-type turbines.



Main and auxiliary switchgear; control and relay equipment.

Generator transformers (ten, 20,500 kVA single-phase units), and distribution transformers.



Power Station auxiliaries, including auxiliary diesel-generator.

BRITISH THOMSON-HOUSTON

THE BRITISH THOMSON-HOUSTON COMPANY LIMITED · RUGBY · ENGLAND

Member of the AEI group of companies

A 4902

PROFIT with HURSEAL

NATIONALLY ADVERTISED HEATING APPLIANCES

HURSEAL

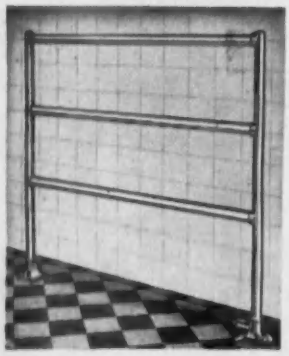
Oil-filled Electric SAFETY Radiators

THERMOSTATICALLY CONTROLLED

The latest Hurseal Portable Radiators are fitted with the New Hurseal Thermostat built in as a standard feature at no extra cost. For permanent installations there is a wide range of Column and Wall panel types. Ask about the Hurseal "Popular"—it will live up to its name and prove an easy and quick seller.

WORLD'S LARGEST MAKERS of oil-filled RADIATORS

Hurseal are the originators of the oil-filled Safety Radiator and the only manufacturers to produce the entire range in their own factory. Only Hurseal Radiators incorporate their world wide patented features and only Hurseal can use the special patented "Hotpoint" Torribar Element. Hurseal are guaranteed; you can sell them with confidence and the assurance of satisfied customers.



Hurseal-Leda oil filled TOWEL RAILS

Always ready sellers—easy to install—cost little to run—available in Wall or Floor models for Gas or Electric operation.

Other Hurseal Products include: Washable Electric Bed Sheets; Domestic Boilers; Electric Warm Air Heaters; Room Thermometers and Temperature Controls; Weather-stripping; Cylinder Jackets and Insulation.

ORDER NOW!

For details write to:

HURSEAL LTD.
229 REGENT STREET, W.1
Tel.: REGent 1051/6.

MARTINDALE

A portable air blast

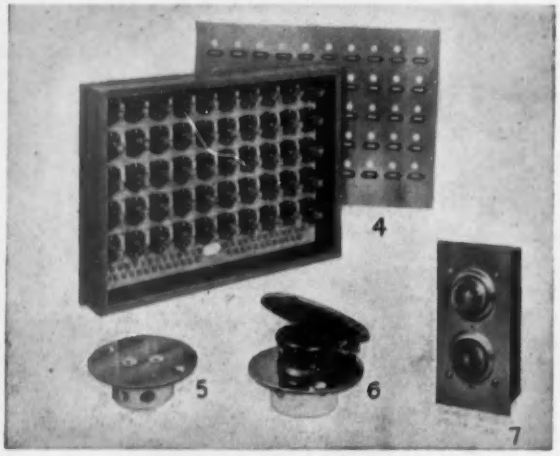
The long thin insulated nozzle makes it possible to blow out dust from the most awkward corners of electric switchgear, motors, electronic equipment and other plant, even when "alive". A selection of five machines of various sizes is available to cover all kinds of work where either a blower or a portable vacuum cleaner is required.

Martindale Portable Blowers are of first-class construction and guaranteed for a year against faulty workmanship. Supplies from stock.

MARTINDALE ELECTRIC CO. LTD.
45 WESTMORLAND ROAD, LONDON, N.W.9
also at 25 ELMBANK STREET, GLASGOW, C.2.

SAX *Special*

ELECTRICAL EQUIPMENT

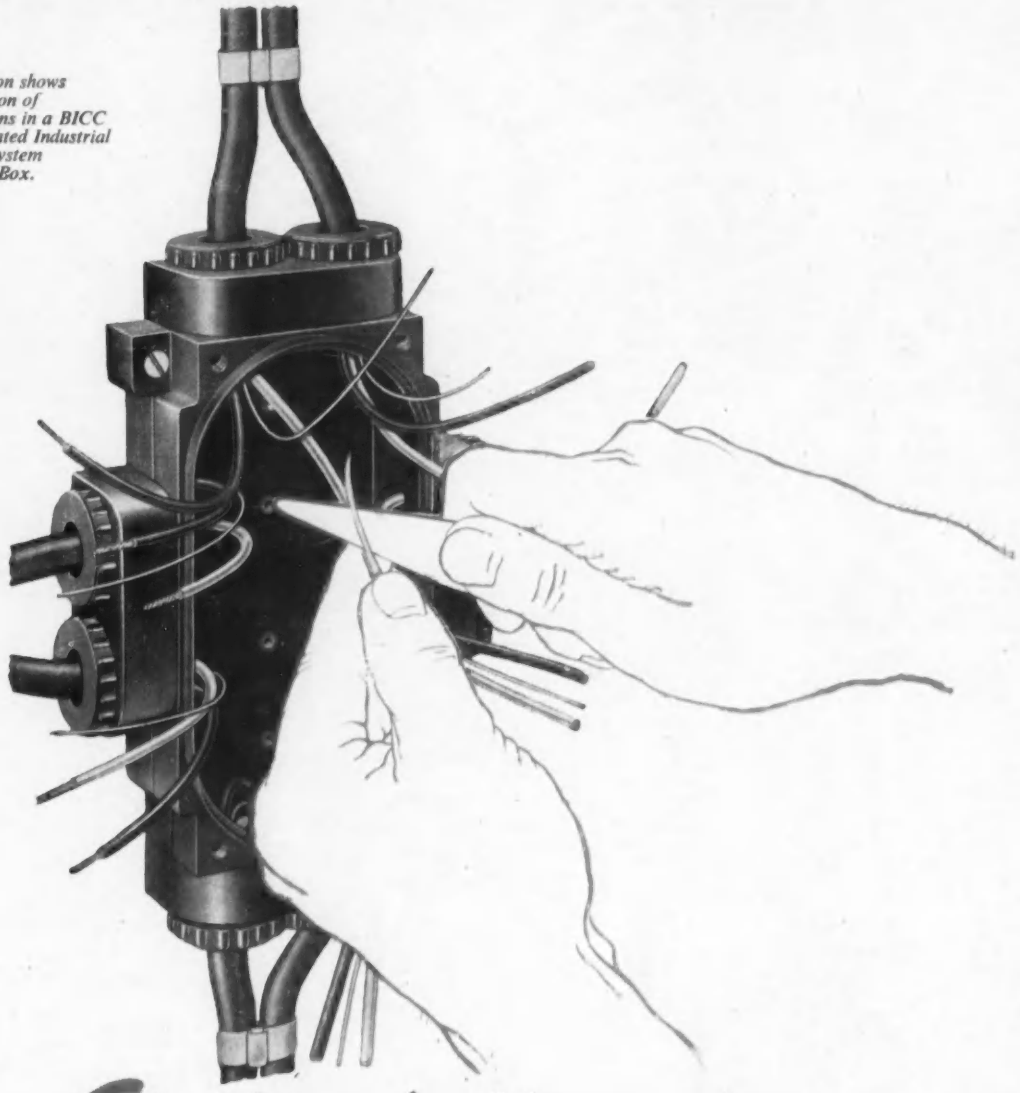


4 *Multi-way Luminous Indicator*
5 *2-Pin B.S.S. Flush Socket*
6 *2- and 3-Pin Spring Hinged Cover Socket*
7 *Domed Glass Luminous Section Indicator*

Catalogue Free on Request

JULIUS SAX & CO. LTD. 24, COMMERCE RD. BRENTFORD, MIDDX
Telephone: EALing 6034 Telegrams: Saxtille, Phone, Brentford, Hounslow

Illustration shows preparation of connections in a BICC All-Insulated Industrial Wiring System Junction Box.



Skilled Hands

deserve the finest materials

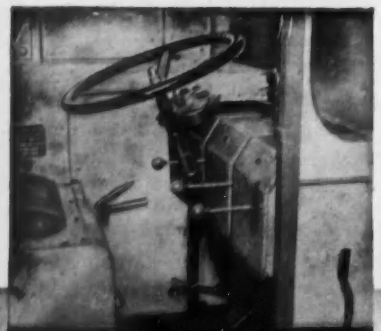
To do a first rate job a craftsman must have confidence in his materials. That is why so many electricians prefer BICC Wiring System Cables. Wiremen know that BICC cables are completely reliable — because they are made with traditional skill from top grade materials. They know, too, that whatever the job, there is a cable in the BICC range to meet every requirement.

May we send you samples?

BICC
WIRING SYSTEM CABLES

BRITISH INSULATED CALLENDER'S CABLES LIMITED BI Callender's **21 BLOOMSBURY STREET, LONDON, W.C.1**

B



COLES HALVE THE TIME.. DOUBLE THE EFFICIENCY

TOP MARKS.. FOR SIMPLICITY OF OPERATION

YOU, SIR! Yes, *you* . . . could lay aside this magazine and after just 30 minutes instruction could operate a Coles Crane. Not like an expert, perhaps, but control it none the less, and if that isn't saying how easy it is . . . well!

It's like this, you see; all the controls are grouped together for easy finger-tip operation, there's no clutch or gears to confuse matters and the crane controllers have a spring return which halts motion instantly you release pressure. Then there is the fully automatic reversing steering mechanism, which is a technical way of saying that no matter what the relative position of the crane cab and chassis, the travel steering is 'natural'. And if you should feel that a big 20-ton lorry-mounted Coles is a bit beyond your capacity, you'd be wrong again, because they all have power-assisted steering which means that even on rough ground you can steer the vehicle with one finger. It all sounds easy . . . like to try it ?*

* *Demonstrations can be easily arranged. Coles cranes are manufactured in a wide range of lifting capacities up to 92,000 lb. Also available are "Electric Eel" Industrial Tractors. Please write for details.*

★ Among the many other advantages of Coles cranes which make for absolute simplicity of operation are :—

A full-vision cab, giving perfect visibility. Several safety devices which are built in as integral parts of the system. The ability to operate each motion individually or in combination and to slew full circle in either direction without limit. Safe, controlled lowering of loads under power, NOT just against the brake. The electric transmission system, which makes possible infinitely variable speeds with positive control and saves power by obviating gear trains.

These are but a few of the reasons why there are more Coles mobile cranes in service today than any other type. For the Coles is the crane with clear advantages from everyone's point of view, be he owner, operator, or maintenance man. It's worth thinking about before you buy a mobile crane.

Designed, manufactured and marketed by

STEELS ENGINEERING PRODUCTS LIMITED

Machinery Department

CROWN WORKS · SUNDERLAND

Telephone: Sunderland 56281 (10 lines). Telegrams: Steel, Sunderland.

SALES & SERVICE:—

Birmingham: 39 Thorp Street, 5 · Glasgow: 235 Bath Street, C.2
London: 6 Avonmore Road, W.14 · Manchester: 153 Oxford Road, 13
Newcastle: Brunswick House, Brunswick Place

COLES

THE NAME THAT CARRIES WEIGHT

BP

ENERGOL

LUBRICANTS

for every industrial requirement

Distributors

THE POWER PETROLEUM CO. LTD.

Head Office: 76/86 Strand, London, W.C.2.
(Branches & Depots throughout the Country)

Our Technical Department will be pleased to advise on your lubrication requirements and problems.

STAND 20 · INNER ROW
GALLERY · NATIONAL HALL

'CORRILUX'

—ideal lighting fitting for indoors—because of its excellent appearance; and for outdoors—because the Corrilux is completely weatherproof, will not corrode and is of great strength

LOWEST PRICED 23/6 100w BULKHEAD FITTING

Exceptional strength body made of corrosion-resisting aluminium alloy, frosted finish

Excellent light distribution

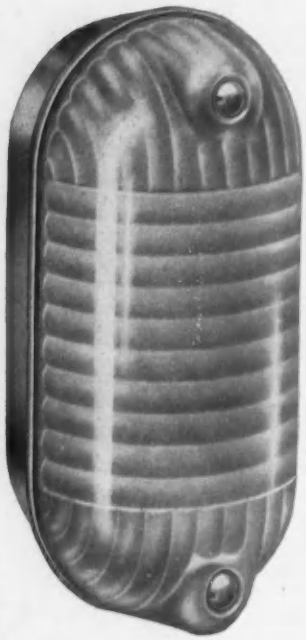
Really attractive appearance and finish

Simple installation—simple maintenance

Completely weatherproof

Better glass mounting 1-piece internally frosted glass of great strength, mounted on non-intercellular rubber gasket

2" centre knockouts and 2 brick-width knockouts for fixing screws



Five ¾" knockout conduit positions

Sealing compound for conduit entry supplied with each fitting

BC lampholder (porcelain) with each Corrilux

Alternative fixing for lampholder position

Holds any lamp up to 100W

Surface or semi-recessed

Through wiring A suitable length of sleeving of glass fibre is supplied to protect cables.

2 secret key screws retain glass. Easily fixed replacement glasses are supplied with captive screws

For passages, corridors, doorways, staircases, toilets, under canopies, and all outbuildings on the farm

MADE BY THE HOUSE OF Simplex

Simplex Electric Co Ltd Blythe Bridge Stoke-on-Trent
London Showrooms: 217-19 Tottenham Court Rd London WC1

A TI COMPANY

Polyphase Meters
for flush mounting on switchboards

- Complete meter assembly withdrawable in chassis.
- Two and three element meters in standard case size.
- Available for all applications of kilowatt-hour, reactive kilovolt-ampere-hour and kilovolt-ampere-hour over limited power factor range; also for maximum demand indication of kW, kVAr and kVA.
- Projecting pattern meters of same type embodying either withdrawable or non-withdrawable features also available.
- Facilities for *in situ* testing with portable test jack.
- Types A42F and A43F meters are described in Publication MS/2003.

'ENGLISH ELECTRIC' meters

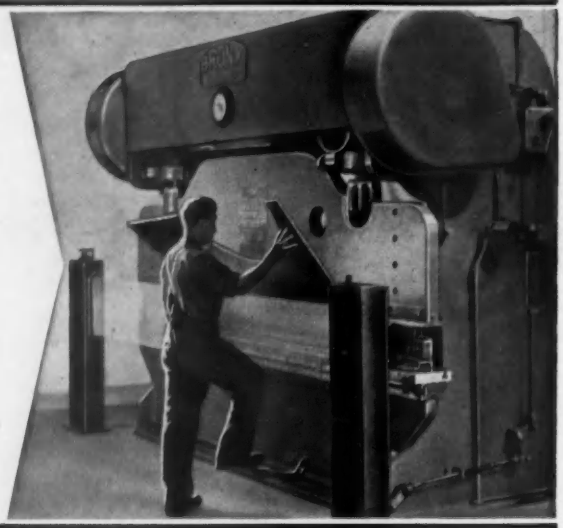
THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2
Meter, Relay and Instrument Division, Stafford
WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON
MS.30AB5

RADIOVISOR EST. 1927

PHOTO-ELECTRIC SAFETY GUARD

★ MEETS ALL THE REQUIREMENTS OF THE MINISTRY OF LABOUR AND NATIONAL SERVICE FACTORY DEPARTMENT

The Photo-electric guards for the protection of press brakes and similar machinery is the modern answer to safety problems. Why use cumbersome mechanical press brake guards which slow down production when a curtain of light can be projected across the danger zone with a higher degree of protection without hampering the worker in any way. This means not only greater safety—but increased efficiency.



Full particulars from Sole Selling Agents in U.K. for Press Guards

J. BROUGHTON & SON (ENGINEERS) LTD

"Security" Works, 234 Pershore Road South, Kings Norton, Factory Centre, Birmingham, 30. *Telephone:* Kings Norton 3305

Manufactured by

RADIOVISOR PARENT LTD

1 STANHOPE STREET, LONDON, N.W.1. Telephone: ★EUSton 5905

The First Name in Photo-Electric Controls

ALWAYS SPECIFY STURDY TRANSFORMERS

and be certain of

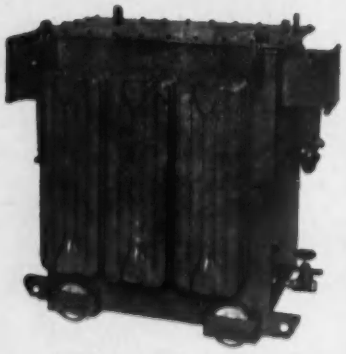
SATISFACTION

Sturdy Transformers are manufactured for all industrial applications from 1 kVA to 100 kVA.

They are being supplied regularly to Government Departments — N.C.B. C.E.A. and many large industrial users.

OUR MANY CUSTOMERS ARE OUR RECOMMENDATION

Our technical service is at your disposal.



Write for our illustrated brochure

STURDY ELECTRIC COMPANY LIMITED

BURNOPFIELD NEWCASTLE UPON TYNE

Telephone: Burnopfield 237

An important announcement about A. T. Starr's outstanding work

RADIO AND RADAR TECHNIQUE

It has been found possible to publish this encyclopaedic work at a reduced price of 60/- net. Written by a leading authority, it contains all the present day knowledge of the essential methods and techniques of radio and radar. It is profusely illustrated and excellently produced. From all booksellers, price 60/- net.

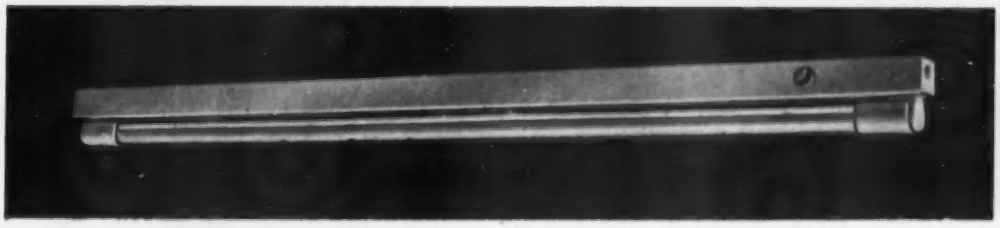
". . . the most ambitious and the most useful British textbook on the subject published in the last few years."
P.O. ELECTRICAL ENGINEERS JOURNAL.

PITMAN

PARKER STREET · KINGSWAY · LONDON, W.C.2.

Looking for something extra?

If it's lighting with extra *quality*, more and more architects and contractors are finding it at Siemens. The reason is a good one—from Siemens "Built-in-Quality" range they can specify lighting Fittings *from stock*. These fittings are outstanding in design and superior manufacture, yet cost no more. Added to this they can make use of Siemens Specialist Advisory Service—the surest way to a first class industrial or commercial lighting installation.



F.T.F. 5231 CEILING FITTING

	Length	Fixing Centres	Weight
F.T.F. 5231 Single 5′ 80 watt - - - -	5′ 4″	40″	15 lbs.

Manufactured from best quality silver sheet steel and finished inside and out with Siemens super-hard 'Haligloss' white stove enamel. "Low-watts-loss" control gear mounted on a detachable platform. Available for either instant-start or switch-start operation.

SIEMENS ELECTRIC LAMPS AND SUPPLIES

SIEMENS ELECTRIC LAMPS AND SUPPLIES LIMITED

Member of the A.E.I. Group of Companies

38-39 UPPER THAMES STREET, LONDON, E.C.4.

PUSH

PULL

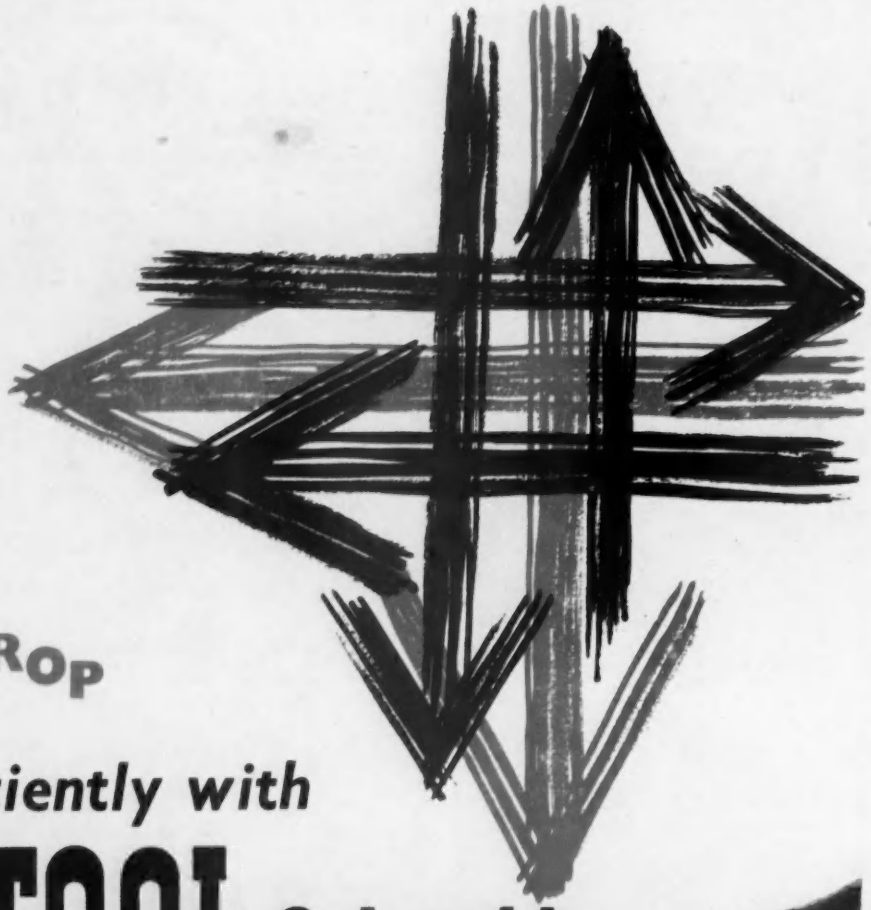
OPEN

SHUT

LIFT

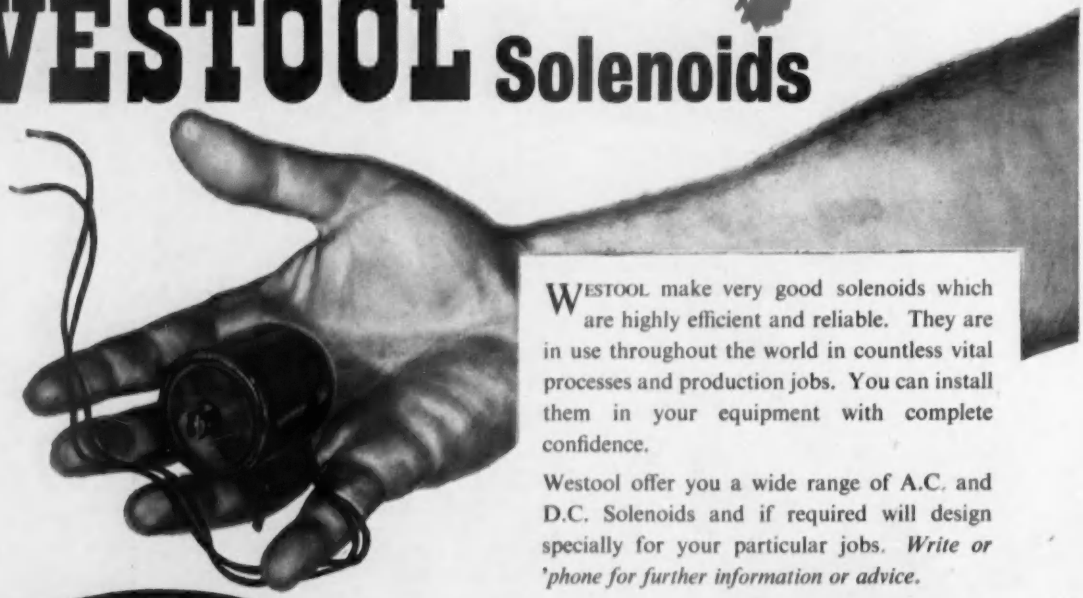
or

DROP



more efficiently with

WESTOOL Solenoids



WESTOOL make very good solenoids which are highly efficient and reliable. They are in use throughout the world in countless vital processes and production jobs. You can install them in your equipment with complete confidence.

Westool offer you a wide range of A.C. and D.C. Solenoids and if required will design specially for your particular jobs. *Write or 'phone for further information or advice.*

WESTOOL LIMITED

ST. HELEN'S AUCKLAND, CO. DURHAM

Telephone: **West Auckland 317 (4 lines)** ***Cables:*** **Solenoid, West Auckland**

Export enquiries to Export Managers: **Stamm & Partners Ltd., 59 St. Martin's Lane, London, W.C.2**

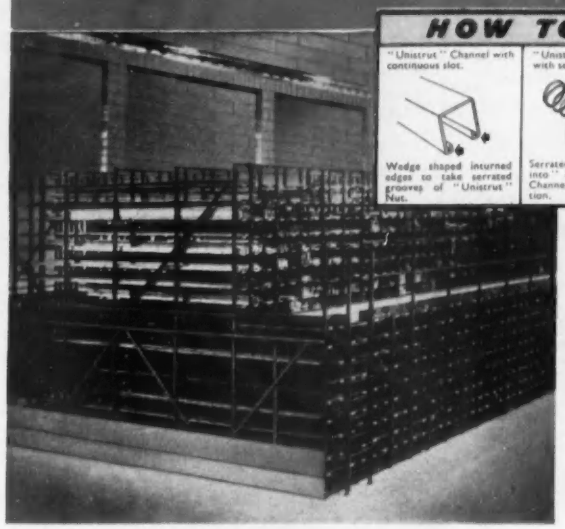
Telephone: **Temple Bar 5383 (10 lines)** ***Cables:*** **Stamstam, London**

Westool also make Coil Winders Transformers Coils Warner Electric Brakes and Clutches Grinders Bench Mixers Air Conditioners etc.

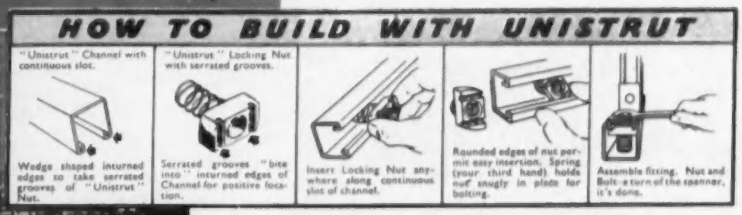
118 22

Build it with UNISTRUT

WITH UNISTRUT AND IMAGINATION YOU BUILD IT BETTER AT LOWER COST

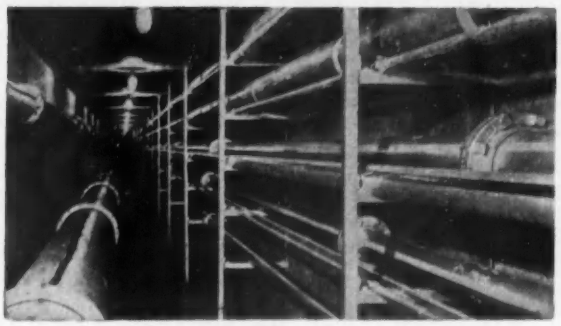


HOW TO BUILD WITH UNISTRUT


"Unistrut" Channel with continuous slot.
Wedge shaped inturned edges to take serrated grooves of "Unistrut" Nut.
"Unistrut" Locking Nut with serrated grooves.
Serrated grooves "bite into" inturned edges of Channel for positive location.
Insert Locking Nut anywhere along continuous slot of channel.
Rounded edges of nut permit easy insertion. Spring (your third hand) holds nut snugly in place for bolting.
Assemble fixing. Nut and Bolt - a turn of the spanner, it's done.

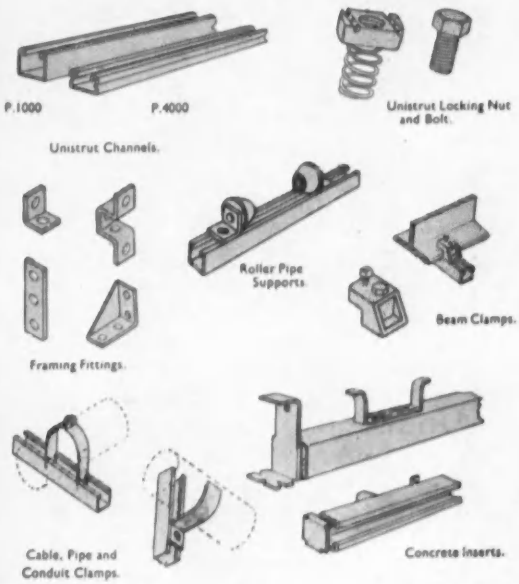
Heavy duty bar stock rack, P1000 construction. Instantly adjustable and re-usable.

Time Card installation. Neat appearance, rigid construction. With Unistrut the fluorescent lighting problem is solved too !



Unistrut concrete inserts, Pipe clamps and metal framing in tunnel piping installation.

Typical UNISTRUT fittings



UNISTRUT— the new answer to old problems, frame, rack, suspend, support all electrical and mechanical equipment, the quicker and easier Unistrut way. It's cheaper, too.

ALL - PURPOSE METAL FRAMING

UNISTRUT Division of
Sankey-Sheldon LTD.
Dept. (U2/ET6) 46 CANNON STREET
LONDON, E.C.4 Tel: CITy 4477 (12 lines)

"SYMEL" SILICONE

ELASTOMER IMPREGNATED GLASS FABRIC

SYMONS' ADVISORY SERVICE

If you have an electrical insulation problem, send it to us! Our Test and Research Department will be pleased to advise you.

In addition to Silicone Elastomer Coated Glass insulation, and we are also manufacturing a Silicone Elastomer Impregnated Glass Cloth which is finding an increasing number of applications. One of these is in the insulation of Class H transformers.

This material is available in thicknesses from 3 mils to 20 mils, in rolls 36" wide or in tapes of any width, and in both straight cut and bias cut form.

The bias cut tape provides a flexible Class H insulation, more suitable for taping round bends than previous materials of this type. By using an elastomer, rather than a Silicone varnish, a softer insulation is produced—one that does not crack when creased or doubled back on itself.

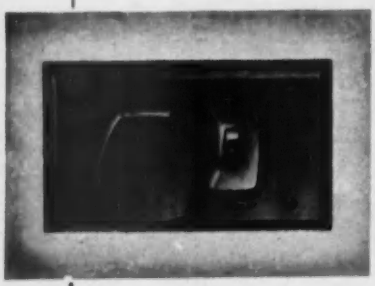
For tested flexible insulation—say SYMONS for sure!

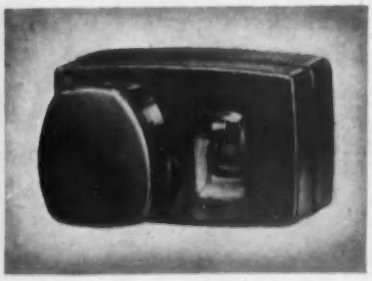
H. D. SYMONS & CO. LTD.

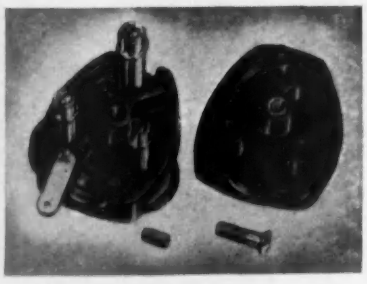
PARK WORKS · KINGSTON HILL · SURREY Tel. Kingston 0091 Grams. INSULATION (phone) KINGSTON-on-THAMES

TEMCO

A.C. SWITCH SOCKETS & PLUGS







★ 5 and 15 amp. 3-pin to B.S.546
★ Surface and flush
★ Single and Double Pole
★ Brown and Cream
★ Designed for easy wiring
★ High quality at low price
★ Neat, attractive, individually packed

If you have not received details of these new TEMCO Switch Sockets and Plugs, please write for the full descriptive leaflet.

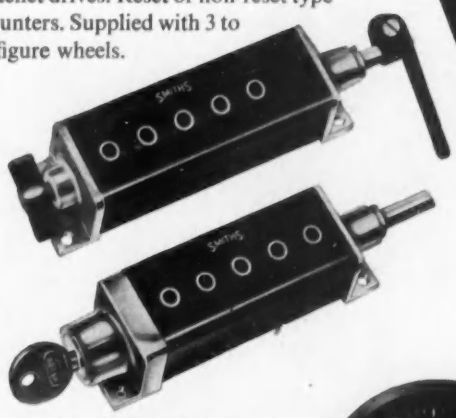
T.M.C.–HARWELL (SALES) LIMITED
37 UPPER BERKELEY ST. LONDON W1
Telephone: PADdington 1867/8/9

Below are detailed some of the many instruments that we can offer to Industry. As our contribution to more efficient production, we are always willing to extend our range to meet any special Instrumentation requirements. Our Technical Staff are at your service for discussing any problems regarding the measurement of Speed, Time, Distance, Quantity, Pressure, Vacuum, Displacement or Temperature.

SMITHS

UNIT COUNTERS

Available with direct, rotary or rotary ratchet drives. Reset or non-reset type counters. Supplied with 3 to 6 figure wheels.

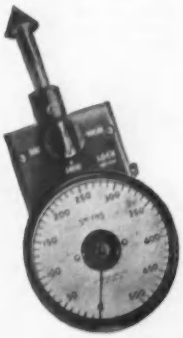


"PETRO-FLEX" FLEXIBLE TUBING

Resists water, oil, industrial gases and solvents.
Temperatures range —40°C. to +80°C.
Working pressures up to 250 p.s.i.
Solves problems of vibration, fitting, etc.

ELECTRIC TACHOMETERS

Operate in conjunction with A/C generator. Remote and Dual-indication of rotational Speeds. Available with 4 in., 6 in. or 9 in. dials.



HAND TACHOMETERS

Versatile, portable hand instruments. Give immediate and accurate readings irrespective of direction of rotation.
Shaft speeds in r.p.m. Belt speeds in feet/metres.
Speed range available from 0–50,000 r.p.m.

STOP WATCHES

A production timer which records how many units can be made in an hour after one unit has been timed. It also gives readings in 100ths of a minute. All operations are controlled by the winding knob.
Seven other models for different applications are available.

SMITHS INDUSTRIAL INSTRUMENTS LTD

CHRONOS WORKS, NORTH CIRCULAR ROAD, LONDON, N.W.2.
Northern Sales Office: YORK HOUSE, YORK STREET, MANCHESTER

The Industrial Instrument Division of S. Smith & Sons (England) Ltd.

A.P. 188-271A

MILLIAMPERES
0
100
200
300
400
500
MOVING COIL
FERRANTI
Sealed Instruments
The Ferranti 3½" hermetically sealed instrument in steel case with fixing flange has received Design Approval from the Joint Service Radio Components Standardisation Committee. This instrument is designed to comply with RCS.231 and RCL (PROV) 231
FERRANTI LTD
MOSTON
MANCHESTER 10
London Office: KERN HOUSE · 36 KINGSWAY, W.C.2

For over half a century Birmal have been

supplying aluminium and magnesium light alloy castings

in the sand, gravity die and pressure die process.

Our reputation is built on solid foundations,

skill . . . quality and craftsmanship.

Our specialist experience in the art of producing

intricate castings of all types

enables us to offer a service that carries on

where most others end.

YOU GET MORE THAN A CASTING FROM

BIRMAL

Birmingham Aluminium Casting (1903) Company Limited
Birmid Works · Smethwick · Birmingham 40

NEW STANDARD INSTRUMENT CASES

News item : the Imhof Standard Range of metal instrument cases has been considerably expanded through the addition of yet more "Standard" cases, racks, consoles and handles.
Obviously, that means a wider, more comprehensive range to select from. Each item is different: each has been designed (in the full sense of the word) : each is soundly constructed : and every housing is available in a number of finishes, either Standard or special !

NEW "OFF-THE-SHELF" DELIVERIES

News item : complementing the increased range of "Standards" are the new deliveries now in force . . .

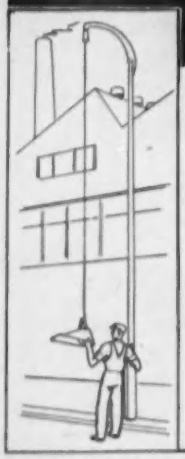
3 DAYS for Cases, Chassis and Handles.
7 DAYS for Racks and Consoles.

These new deliveries apply to existing "Standard" cases : the same deliveries will soon be announced for the new and more recent additions to the Range.
So there it is. If you are a user of instrument cases write (or 'phone) to the address below for further details : or, of course, come along to our new showrooms on the Third Floor of Imhof House—and see for yourself !

For worthwhile cases, racks, consoles and handles

IMHOFS

Dept. G6, ALFRED IMHOF LIMITED,
112-116 New Oxford Street, London, W.C.1
Telephone: Museum 7878



The down-to-earth method is L.E.F. Raising & Lowering Gear

Factory and public street lights, including the Mazda "NINE" and Benjamin "Duo-flux" floodlights, can be very easily made accessible for servicing when L.E.F. Raising and Lowering Gear is installed.

Simply by operating a small hand winch, the light is lowered and, after maintenance, raised again. It is so easy and because it is quicker and requires less manpower, economical too !

Write or telephone for full details.

LONDON ELECTRIC FIRM LTD.
South Croydon, Surrey. **Telephone: Uplands 4871**

THE DIXON-LESLEY HOLE CUTTER

Teeth are Removable for Resharpening or Renewal. **Mandrels are Interchangeable with all sizes of Tools.**

This new hole cutter designed for use in Portable and Fixed Drilling Machines ¼ in. capacity and upwards is capable of drilling many hundreds of holes in steel, cast iron, etc., at a drilling speed of approximately the same as a ½ in. twist drill.

The teeth are of super high speed steel and are removable. Regrinding can be carried out by unskilled labour on a 6 in. bench grinding machine, and from four to six re-grinds are possible before replacement of teeth is necessary.

Swarf clearance is most effective to full drilling depth, and, due to flats on the back supports and limited tooth projection, rate of feed is controlled and cannot be exceeded by force.

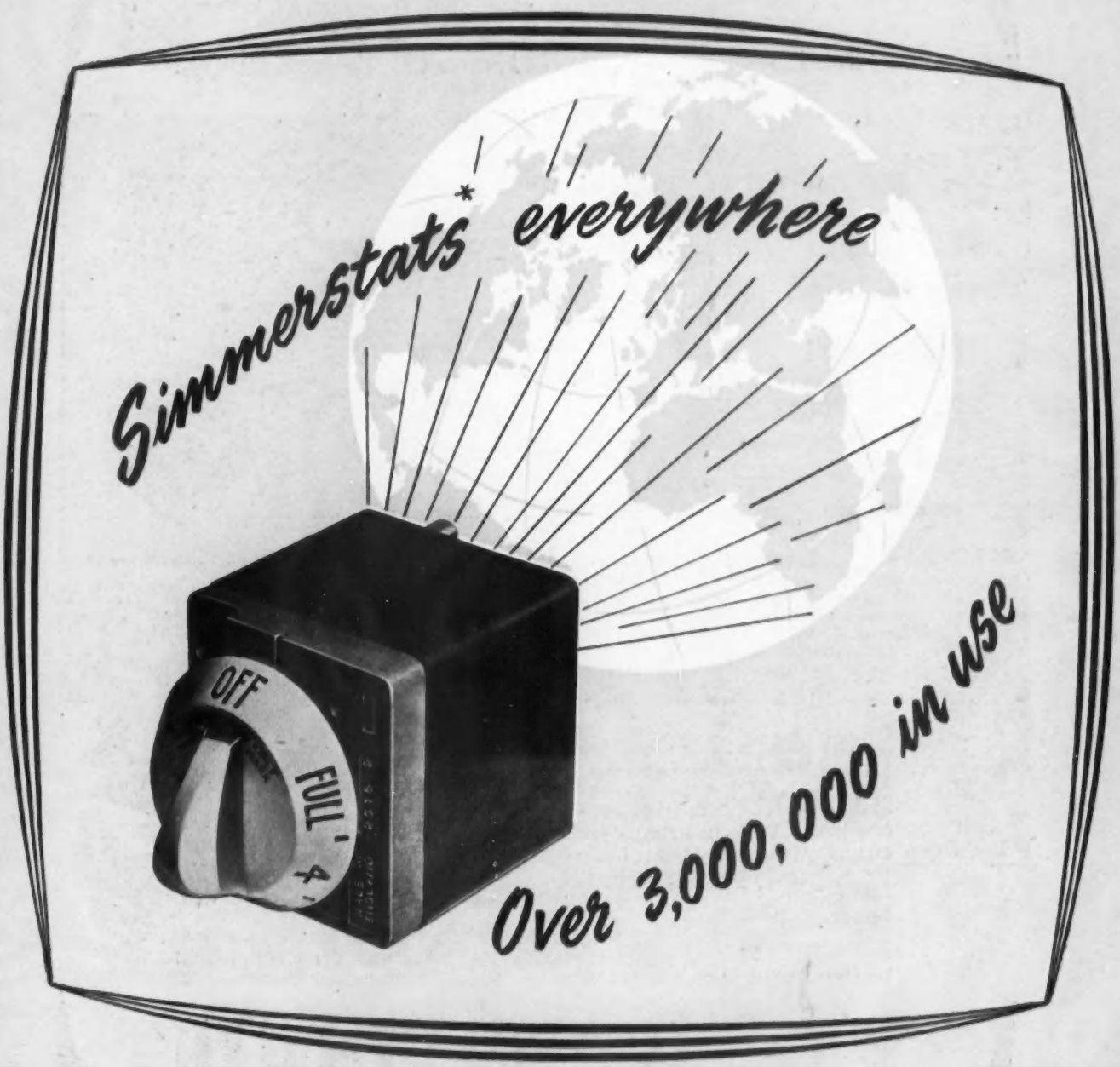
The teeth permit efficient operation at some 2½ to 3 times the maximum cutting speed of normal carbon steel and holes up to 2 inches diameter can be drilled in steel with most of the standard ½ in. portable tools on the market.

Prices for bodies, complete with teeth, range from £1. 5s. to £1. 10s. Straight Shank and Morse Taper Mandrels, with pilot drills, are from 15s. to 18s. 6d. Replacement prices teeth, per set of 3, 10s. 6d., H.S. Pilot Drills 4s. Delivery ex-stock.

Distributed to the Electrical Trade through:
THE GENERAL ELECTRIC CO. LTD., Magnet House, Kingsway, London, W.C.2.—Telephone, Temple Bar 8000.
THE SUN ELECTRICAL CO. LTD., 118/124 Charing Cross Road, London, W.C.2.—Telephone Temple Bar 3500.
London Stockists for the Tool Trade:
PAUL P. BECK, Ibex House, Minories, London, E.C.3.—Telephone Royal 2234.

DIXON-LESLEY LIMITED
28 ST. MARY'S PLACE, NEWCASTLE-UPON-TYNE, 1

PROGRESS IN CONTROL



SUNVIC CONTROLS LTD. (Domestic Division)
No. 1 Factory, Eastern Industrial Estate,
Harlow, Essex. Telephone : Harlow 25271

Manufacturers of 'Simmerstat' Regulators, Oven Thermostats, Radiant Hotplates and Pneumatic and Electrical Instruments for detection, measurement, control and recording of temperature, flow, liquid-level, specific gravity and pressure, in science and industry. Vacuum pumping and measuring equipment, etc.

Member of the A.E.I. Group of Companies

★ *'Simmerstat' is the registered trade mark of Sunvic Controls Ltd.*

EQUIPMENT BY

SUNVIC

TAS/SC.329

'Superform' switchboards

for the control of MEDIUM VOLTAGE circuits

Incorporating H.R.C. CHASSIS TYPE FUSE-SWITCHES in ratings up to 750 amps.

Illustration shows duplicate busbar switchboard in course of installation at Bowaters' Lloyd Pulp & Paper Mills, Limited, Sittingbourne, Kent.

MODERN STYLING: Easy to clean smooth flush contour. Retractable switch operating handles.

SAFETY FEATURES: Busbars, connections and terminals fully insulated. Potential circuits fused at supply point. Integral cylinder locks fitted to fuse-switches.

PERFORMANCE: Fuse-switches proved for making capacity on 50 MVA. at 440 volts, 3-phase, 50 cycles.

ACCESSIBILITY: Hinged instrument panels give ready access to instruments, terminal boards and small wiring.

'ENGLISH ELECTRIC'

fusegear

THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

Fusegear Division, East Lancashire Road, Liverpool 10

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

FG.24C5

Whatever the project...

specify

MERSEY

QUALITY CABLES FOR LONG SERVICE

MERSEY CABLE WORKS LIMITED

LINACRE LANE · BOOTLE · LIVERPOOL 20

Telephone: BOOTLE 4111 (4 lines) *Telegrams "MERCABLES", LIVERPOOL 20*

A TI COMPANY

C

★ Economical and efficient electrical wiring using *Lockers* Durite CABLE TRAYS and BENDS . . .

Supplied in all sizes and metals and ideal for any difficult wiring problem. If you want the right type, and quickly — just leave it to Lockers.

★ HANGER FABRICATION . . .

SIMPLICITY and SPEEDY ERECTION

Save time on the job and cut costs for the job — by using Lockers perfectly designed Angle for speedy installation. Any standard lengths, self-coloured or painted with lead primer. Holes at standard centres to accommodate any length of cable dropper, ceiling bracket or cross member. Nuts and bolts supplied.

Our fully qualified Technical Advisory Department will supply information and advice at any time.

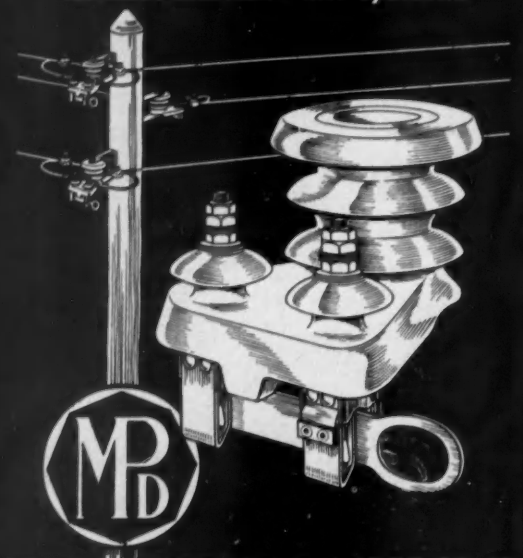
Lockers of Warrington

LOCKERS (METAL PERFORATORS) LTD.
WARRINGTON, ENGLAND
Telephone : Warrington 910

MEMBER OF THE JL GROUP

DISCONNECTING SWITCHES

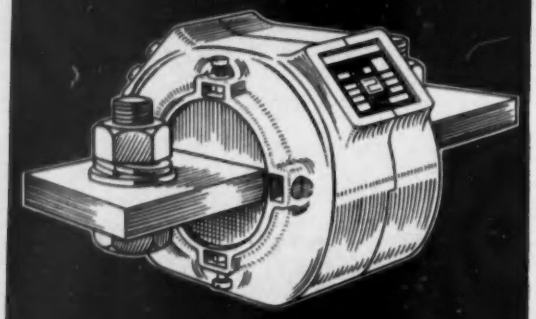
SWITCH FUSES · SCREW PLUG FUSES
for local overhead line systems



MAX PURRMANN K.-G.
SCHALTGERAETEBAU
DUESSELDORF-HOLTHAUSEN
GERMANY Cables: "ELECTROPLATIN"

INSTRUMENT TRANSFORMERS

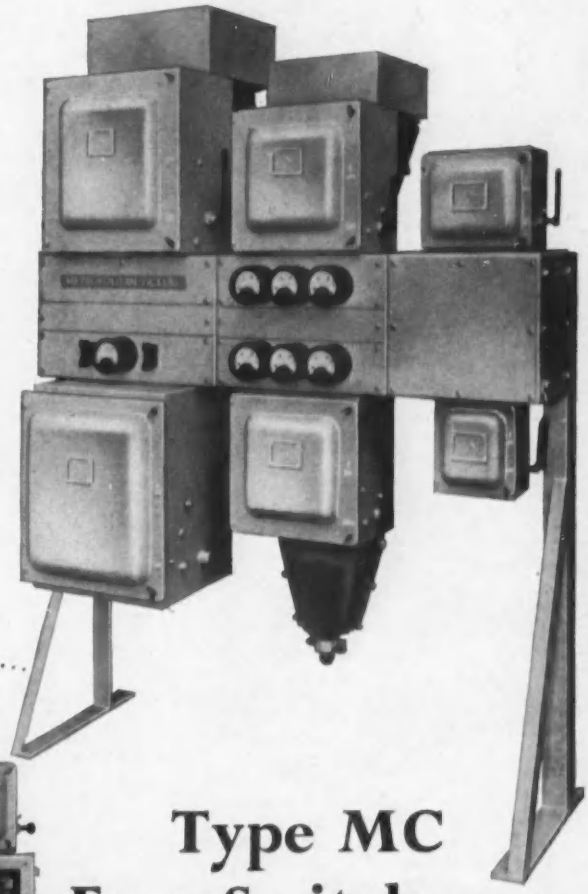
Metering Current Transformer Type R 712
5VA and 15VA. Classes BM, CM, A, B & C



PURRMANN & HERR
GMBH
MESSWANDLER
DÜSSELDORF-HOLTHAUSEN
W. GERMANY
Cables : "ELEKROMESS" Tel. 712167

Australian Agent: A. V. H. Electrical Engineering Co., Melbourne

True Unit Construction



Type MC Fuse-Switchgear

The design of type M C fuse-switchgear means greater flexibility in service because of the unit construction principle. The equipment is easier to fit, so cutting installation costs and contractors' overheads. It is easier to maintain, since all component parts are easily removed. Available in all ratings up to 500 amps and 660 volts.

Write for full details.

METROPOLITAN-VICKERS
ELECTRICAL CO LTD · TRAFFORD PARK · MANCHESTER, 17

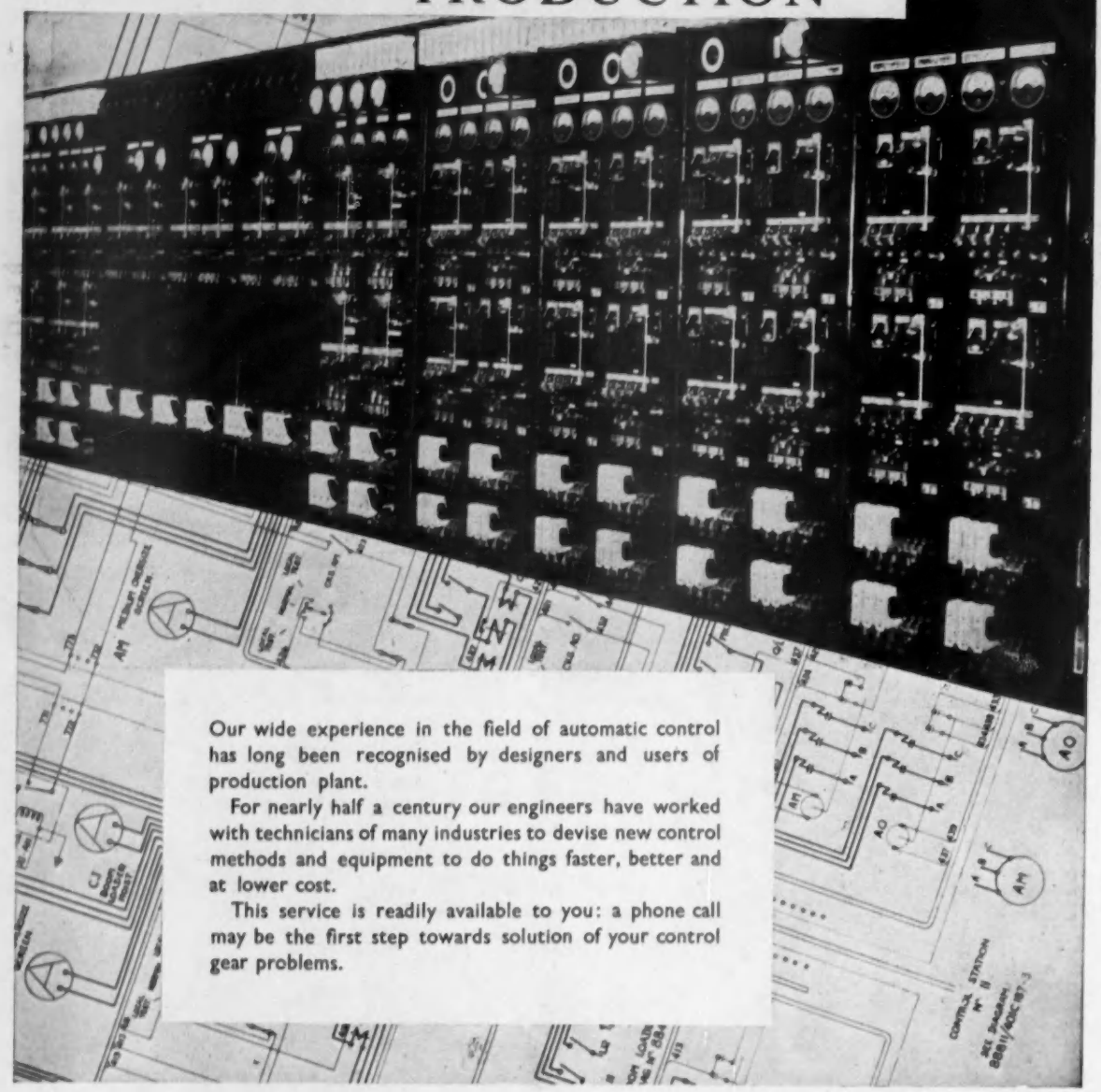
Member of the A.E.I. group of companies

Leading Electrical Progress

F/V402

MOTOR IGRANIC CONTROL

PLANNING FOR
PRODUCTION



Our wide experience in the field of automatic control has long been recognised by designers and users of production plant.

For nearly half a century our engineers have worked with technicians of many industries to devise new control methods and equipment to do things faster, better and at lower cost.

This service is readily available to you: a phone call may be the first step towards solution of your control gear problems.

IGRANIC ELECTRIC CO. LTD

HEAD OFFICE & WORKS · BEDFORD

TELEPHONE: BEDFORD 66261 TELEX 14-533

Branch Offices:

LONDON BIRMINGHAM BRISTOL CARDIFF EAST ANGLIA GLASGOW LEEDS MANCHESTER NEWCASTLE SHEFFIELD

A METAL INDUSTRIES GROUP COMPANY

IG/36/1468

THERE's not a choke anywhere. Nor a starter. Nor a P.F. capacitor. All there is, in fact, is a fluorescent lamp in series with a tungsten lamp. For this is Philips "Gear-less" Fluorescent Lighting . . . and what a magnificent light it is!

Philips "Gear-less" Lighting is three times lighter in weight than standard fluorescent lighting—yet costs only half as much. So it gives you a new market — a new market for inexpensive fluorescent lighting.

Your first step? Get in touch with Philips right away!

So many sales features!

Lowest priced fluorescent lighting. Fluorescent lamp and filament lamp can be fixed separately or together, as desired · Absolutely noiseless in operation · Very light weight · No control gear or starter switch required · With Deluxe Warm White lamp gives perfect colour rendering for the display of food · Light equal to two 100 watt filament lamps for only 115 watts.

"GEAR-LESS" FLUORESCENT LIGHTING

from PHILIPS

PHILIPS ELECTRICAL LIMITED

Lighting Division, Century House, Shaftesbury Avenue, London, W.C.2

TUNGSTEN, FLUORESCENT, BLENDED AND DISCHARGE LAMPS · LIGHTING EQUIPMENT · RADIO AND TELEVISION RECEIVERS, ETC.

(LD777)

PROSCON

ROOM THERMOSTAT TYPE "R"

A most attractive and reliable instrument for domestic or commercial applications. Moulded cover is in light grey with knob and dial finished in maroon, harmonising with any scheme of decoration. ON and OFF switch embodied on control knob if required. Suitable for both surface and flush wiring.

Rating: 15 amps A.C. 250 volts.

Ranges: 30-70° F. or 40-80° F. without switch, 48-72°F. with switch.

A metal clad industrial type instrument is also available for greenhouse or factory use, Type RG/H. Range: 40-80°F.

Please send for List RT/151.

PROCESS CONTROL GEAR LTD.
56 VICTORIA STREET · ST. ALBANS · HERTFORDSHIRE
TELEPHONE:- ST. ALBANS 2030 & 6689 TELEGRAMS:- PROCONGEAR, ST. ALBANS

MINERVA ELECTRICAL INSULATING VARNISHES LACQUERS, ENAMELS & COMPOUNDS

REGISTERED TRADE MARK

STOVING VARNISHES (Natural Resin Type)
STOVING VARNISHES (Synthetic Resin Type)
THERMO-SETTING VARNISHES
AIR-DRYING VARNISHES
CLOTH VARNISHES
CORE-PLATE VARNISHES (Stoving and Air-Drying)
COPPER-WIRE ENAMELS (Oleo-Resinous and Synthetic Types)
ACID AND HEAT RESISTING ENAMELS (Available in all colours)
MICA BONDING VARNISHES
COIL STICKING VARNISHES
SLEEVING VARNISHES (Black, Clear and Colours)
CABLE LACQUERS (Non-Flam., Cellulose Type and P.V.C.)
COMPOUNDS (Various Types)

All the above are supplied in black and clear.

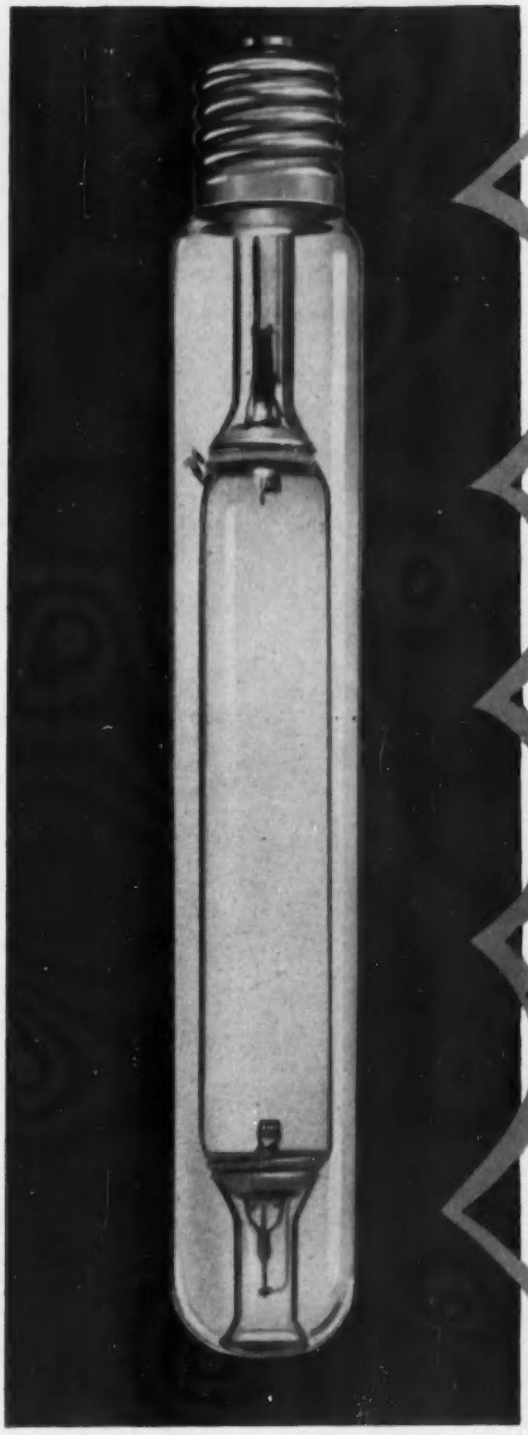
All the materials listed conform to B.S. Specifications wherever applicable.

As Insulating Varnish Specialists, our Research Laboratories have the most modern type of equipment. We invite you to consult our Technical Staff whose services are always at your disposal, on all matters relating to the use and application of our Minerva Insulating Varnishes, Lacquers, Enamels and Compounds.

PINCHIN, JOHNSON & CO.

4 CARLTON GARDENS, LONDON, S.W.1 **Telephone: TRAfalgar 5600**

BY APPOINTMENT TO HER MAJESTY THE QUEEN MANUFACTURERS OF ELECTRIC LAMPS CROMPTON PARKINSON LTD



Simpler -stronger -better !

- the new CROMPTON

MERCURY DISCHARGE LAMP

Simpler . . .

The new form of construction does away with unsightly wire supports. Starting electrode resistance is more compactly mounted—shorter connections reduce vibration strain.

Stronger . . .

Greatly increased resistance to shock in transit or usage. Vulnerable connections have been eliminated. Inner tube is held firmly by asbestos-cushioned glass supports *which are part of the outer bulb.*

Better . . .

More efficient: initial light output is higher and lumen maintenance is improved. *Longer lasting:* no bulb discoloration through overheated wire-work. The new Crompton lamps stay clear and bright even after 4,000 burning hours.

. . . and at no extra cost!

Crompton

LAMPS

You cannot buy better

CROMPTON PARKINSON LTD., CROMPTON HOUSE, ALDWYCH, LONDON, W.C.2. TELEPHONE: CHANCERY 3333.

ELECTRICAL EQUIPMENT

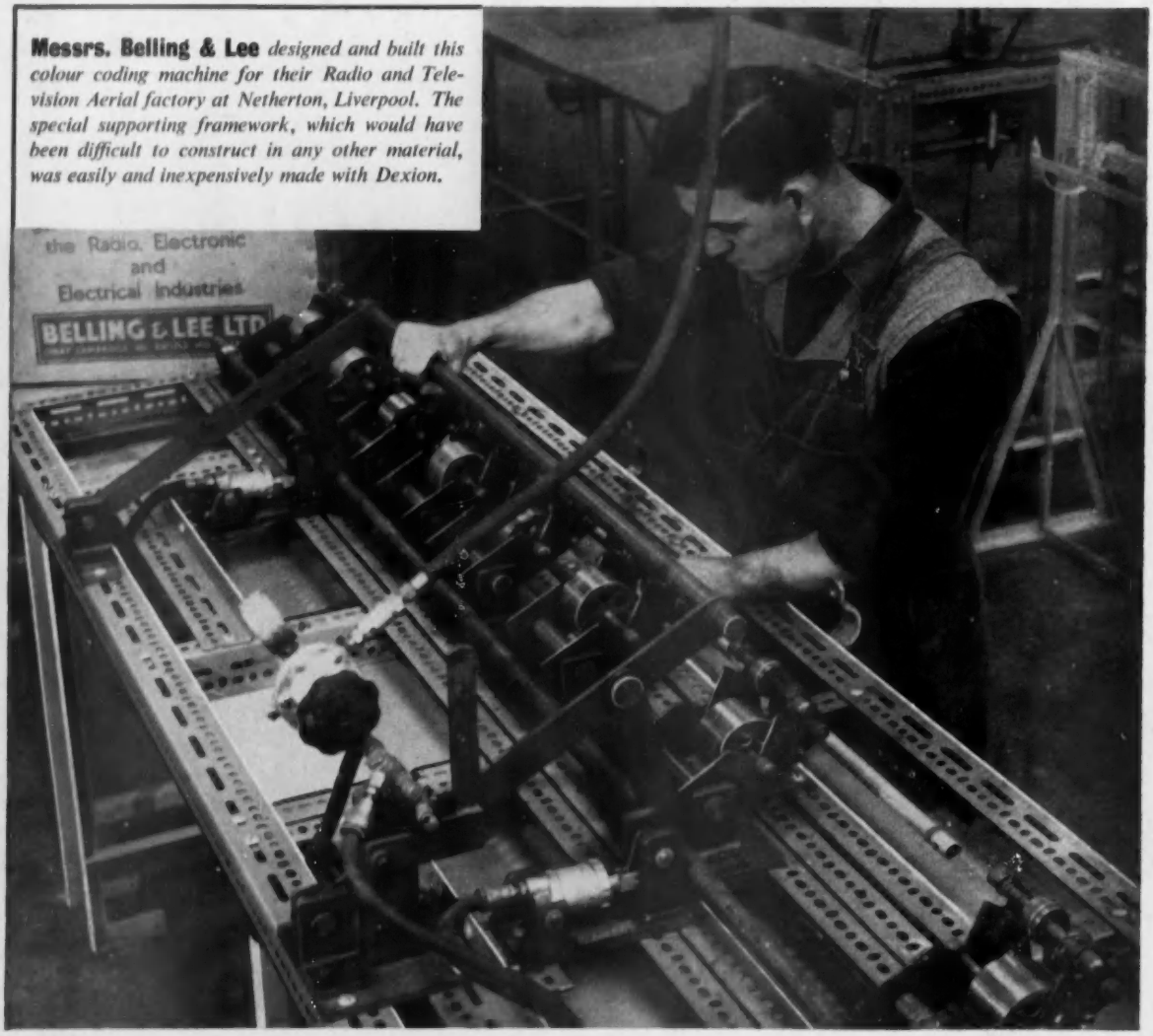
BUILD YOUR OWN

quickly, cheaply, strongly, *exactly*

FOR almost any kind of works or storage equipment you may need — storage racking, machine stands, trolleys, work-benches, maintenance platforms, and a hundred other items—you'll find Dexion Slotted Angle the sturdiest, cheapest, most versatile material.

Dexion is far easier and quicker to work with than wood or angle iron. It merely needs cutting and bolting — no precise measurements or drawings, no drilling or welding, no skilled carpentry, no painting. *The work has been put into it already*, so that unskilled labour can handle any job. You get exactly the structures you need, without delay, and generally at a big saving.

Dexion is scientifically designed so that every slot and hole has a function, and the remaining metal is left where it gives greatest strength. It *continues* to save you money, because any Dexion structure can be swiftly altered or dismantled and the Dexion used again. There is no waste, no scrap.



Messrs. Belling & Lee *designed and built this colour coding machine for their Radio and Television Aerial factory at Netherton, Liverpool. The special supporting framework, which would have been difficult to construct in any other material, was easily and inexpensively made with Dexion.*

EQUIPMENT—

as you want it—with versatile

DEXION slotted angle

Dexion is the Slotted Angle that started an industry. Now, over 75 million feet are being used by more than 45,000 firms all over the world. *And 80 per cent of Dexion sales are repeat orders.*

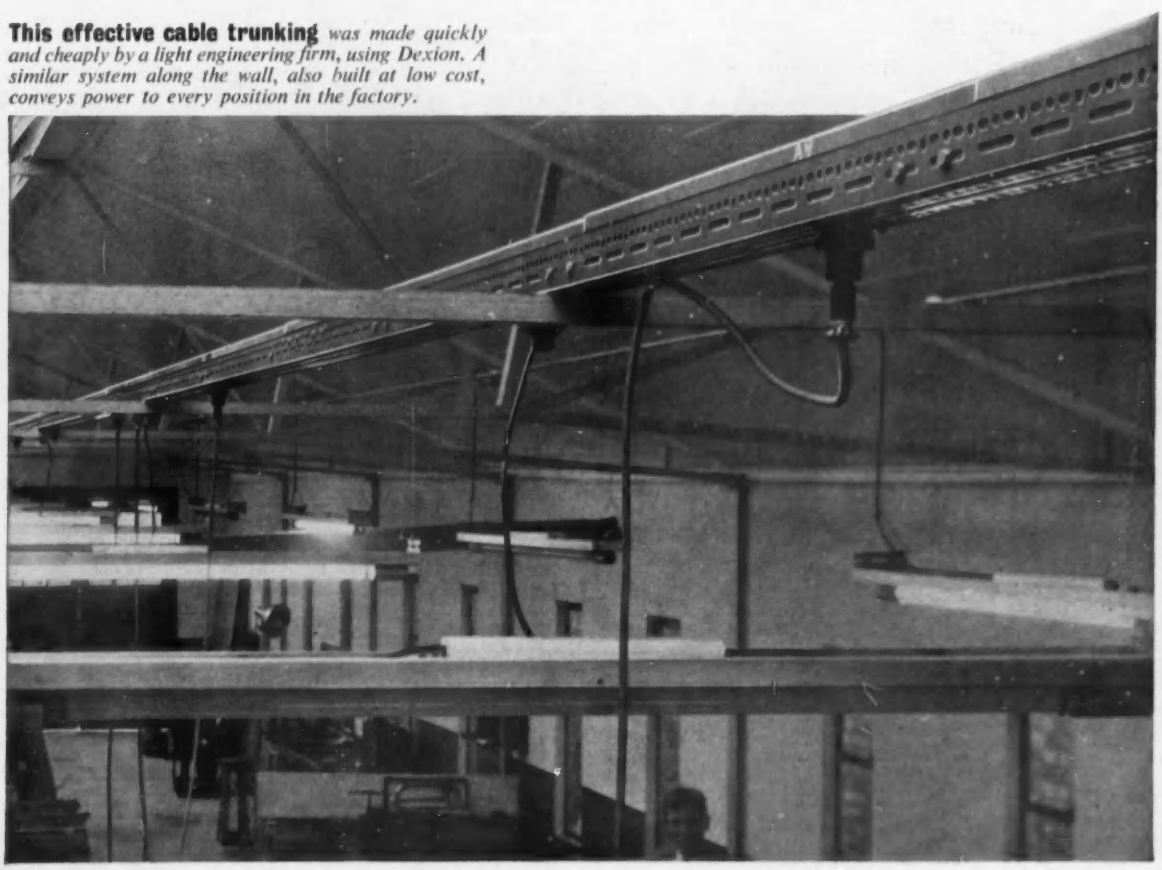
DEXION
REGD.
SLOTTED ANGLE

GET THE FACTS

Dexion 225 is sold in packets of ten 10-ft. lengths, complete with bolts. Steel Dexion (price from 1/3½ to 1/5 per foot) is rust-protected, stove enamelled. Where a light but strong, non-magnetic, non-corroding material is required, use Alloy Dexion (technical details and prices on request). New Dexion 300, fully interchangeable with other types, is larger in section (3″ × 1½″) — prices on request.

Dexion Service offers advice or design assistance on any problem, and construction teams are available. Send today for sample piece of Dexion and booklet AK 140 illustrating uses in many industries. Dexion Ltd., 65 Maygrove Road, Kilburn, N.W.6. (Telephone: MAIda Vale 6031-9.)

This effective cable trunking *was made quickly and cheaply by a light engineering firm, using Dexion. A similar system along the wall, also built at low cost, conveys power to every position in the factory.*



Into the future

THE DEVELOPMENT OF NUCLEAR POWER

Simon-Carves command an outstanding combination of research, engineering and contracting resources for the design and erection of forced-circulation and natural-circulation water-tube boilers and the acceptance of responsibility for the whole of the mechanical, electrical and civil engineering work involved in the building of complete power stations.

These resources are now being brought to bear on the problems of nuclear power production, for the study of which a new organisation has been set up in partnership with the General Electric Company.

With a long tradition of engineering enterprise and a formidable weight of scientific resources, Simon-Carves are preparing to contribute to the development of nuclear power production throughout the world.

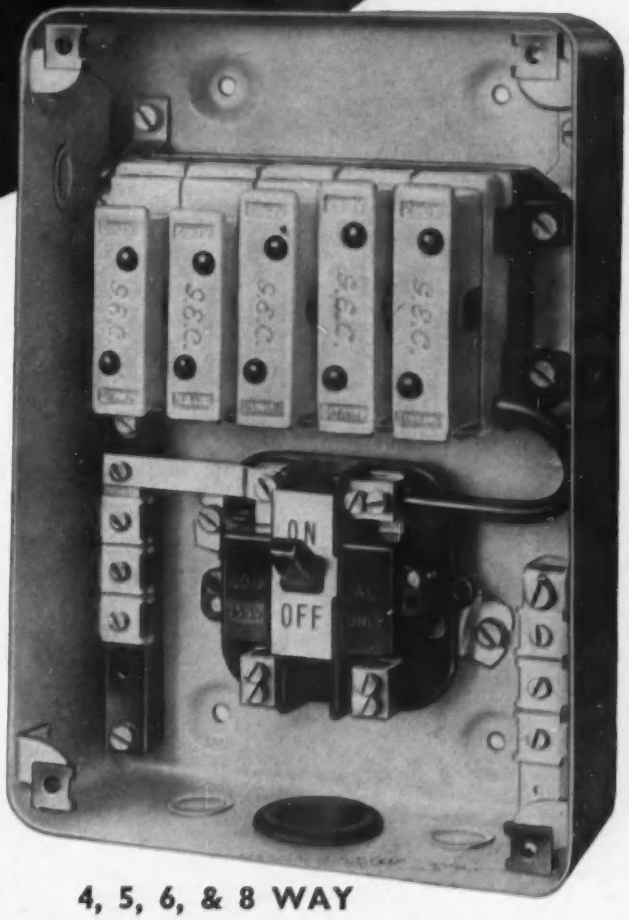
Simon-Carves Ltd SIMON ENGINEERING GROUP

CHEADLE HEATH STOCKPORT ENGLAND

We are Exhibiting at the Fuel Efficiency in Industry and Home Exhibition OCT. 12-22 1955 CITY HALL DEANSGATE MANCHESTER Organised by Provincial Exhibitions Ltd

SC 134/PS

FOR DOMESTIC INSTALLATIONS



- ★ FIRST CLASS DESIGN
- ★ HIGH QUALITY FINISH
- ★ FOR A.C. CIRCUITS UP TO 250 V.
- ★ H.R.C. OR REWIRABLE FUSES (5, 15 or 30 amp.)
- ★ IMMEDIATE DELIVERY

SPECIFY

4, 5, 6, & 8 WAY

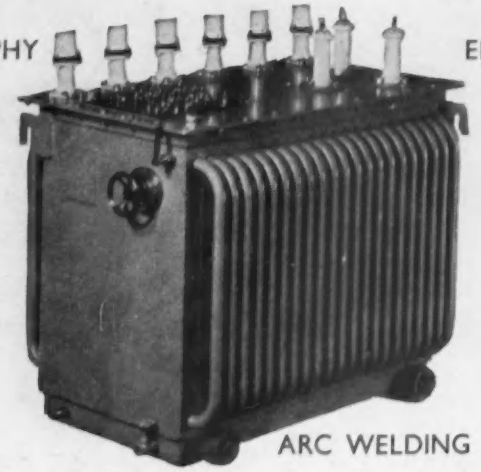
G.E.C. D. W. COMPOSITE UNITS

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2

ELECTROSTATIC PRECIPITATION OF DUST HIGH FREQUENCY HEATING

TO EVERY

INDUSTRIAL RADIOGRAPHY ELECTRIC HEAT TREATMENT



RESISTANCE WELDING ARC WELDING RESISTANCE FURNACES

PROBLEM

ELECTROSTATIC PAINTING PRESS WELDING ARC FURNACES ELECTROPLATING

THERE'S A

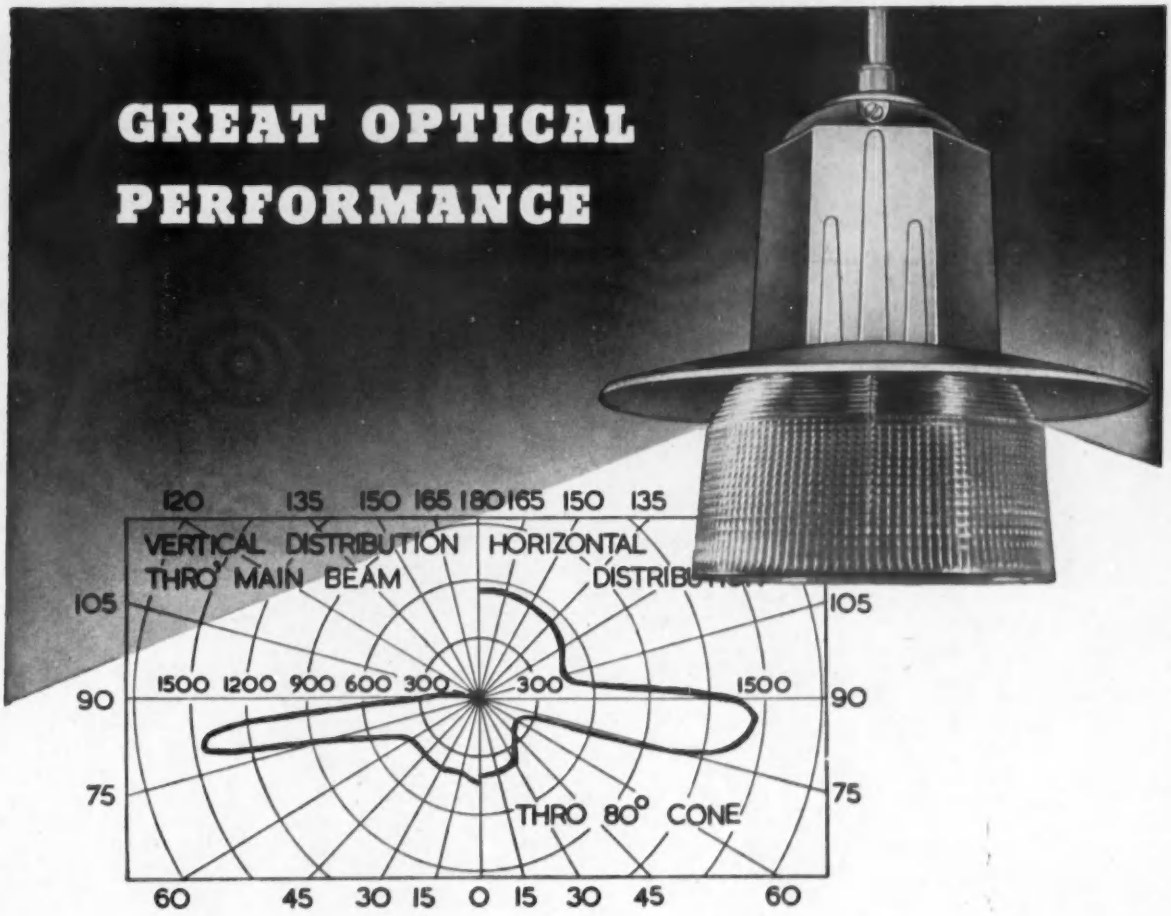
GRESHAM
TRANSFORMERS LTD

ANSWER

RING THE SPECIAL APPLICATIONS DIVISION · FELtham 2271

TWICKENHAM ROAD · HANWORTH · MIDDLESEX

GREAT OPTICAL PERFORMANCE



PLUS THESE OUTSTANDING FEATURES!

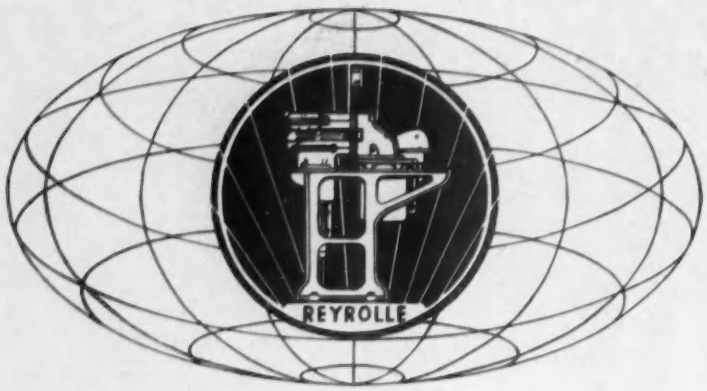
The 'Welwyn' one of the series of street lighting lanterns designed by Eleco is made for 100-200 watt Tungsten, or 80-125 watt Mercury Discharge Lamps. The 'Welwyn' besides giving the highest degree of optical performance—will give years of trouble-free service with a minimum of maintenance.

Here are some of the reasons why:

1. The lantern is made in only 3 main parts: die-cast aluminium body; the lamp holder bridge assembly; dome type refractor.
2. The refractor and focal position stops are cast with the body.
3. The lamp holder bridge and lamp holder can be removed by loosening focal stop screws and turning slightly.
4. Single piece glass dome refractor (available for axial or non-axial distribution) gives maximum light control and high output.
5. The refractor is firmly held in correct relation to the body, by solid internal spring loaded clips.
6. These springs are enclosed within the body casting—completely protected from the weather.

ELECO **ENGINEERING & LIGHTING EQUIPMENT CO. LTD**

SPHERE WORKS · ST. ALBANS · HERTS



Switchgear specialists with a worldwide reputation

Manufacturers of:

AIR-BLAST SWITCHGEAR

SMALL-OIL-VOLUME SWITCHGEAR

OIL-BREAK SWITCHGEAR

AIR-BREAK SWITCHGEAR

FLAMEPROOF SWITCHGEAR

DISTRIBUTION SWITCHGEAR

CONTROL EQUIPMENT

PROTECTIVE GEAR

A.C. COMMUTATOR MOTORS

ARC-WELDING EQUIPMENT

ELECTRICAL ACCESSORIES

Reyrolle

HEBBURN · COUNTY DURHAM · ENGLAND

TIME IS THE FATHER OF TRUTH . . .

. . . Time shows the wisdom of choosing J. & P. cable.

Time proves the reliability of cable produced with the knowledge and experience gained during our 80 years as pioneers in the electrical industry. Specify J. & P. and your cable installations will be efficient for years . . and years . . and years.

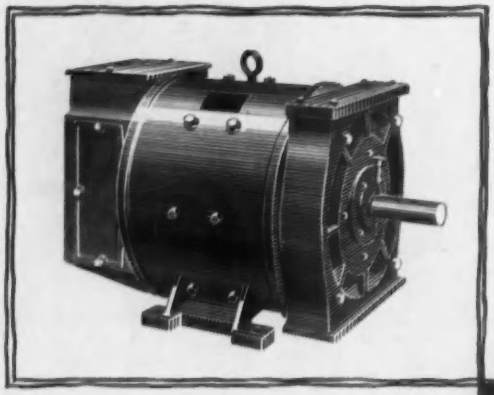
J. & P. ARE FOUNDER MEMBERS OF THE CABLE MAKERS ASSOCIATION

ALL J. & P. BRANCHES STOCK . . .

322 TYPES AND SIZES OF V.I.R. CABLE

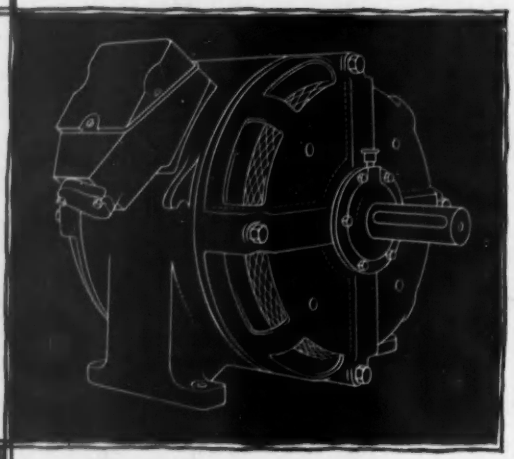
The mark that means that 'little more' in quality

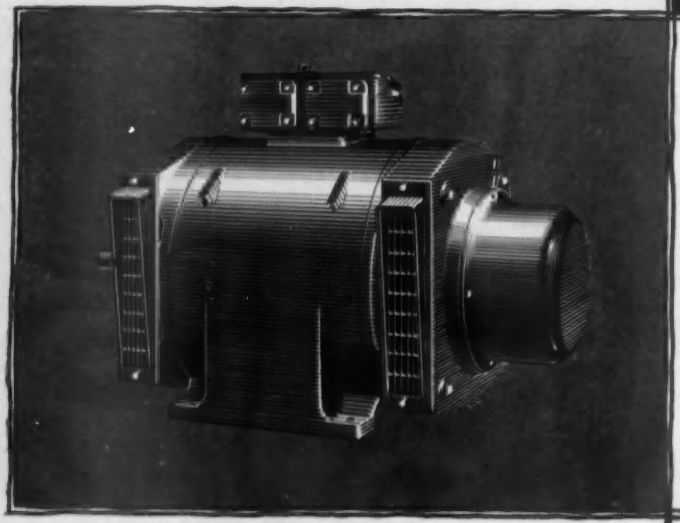
JOHNSON & PHILLIPS LTD.
CHARLTON, LONDON, S.E.7
•
ELECTRICAL ENGINEERS AND CABLE MAKERS



They bear

the name **G.E.C.**





...and a name for **RELIABILITY**

G.E.C.

STANDARD INDUSTRIAL MOTORS

THE GENERAL ELECTRIC CO. LTD., MAGNET HOUSE, KINGSWAY, LONDON, W.C.2.

THURSDAY, 8 SEPTEMBER, 1955
Volume No. 128 Number 3331
REGISTERED AS A NEWSPAPER

ELECTRICAL TIMES

ESTABLISHED 1891

SARDINIA HOUSE, SARDINIA STREET, LONDON, W.C.2
Telegrams: Equivolt, Estrand
Telephone: HOLborn 6016

Editor and Managing Director:
ROY BALDWIN, M.I.E.E., Barrister-at-Law

Assistant Editors:
J. K. JOHNSON, B.SC.(ENG.), A.M.I.E.E.
K. C. POUNDS, B.SC.(ENG.), A.C.G.I., A.M.I.E.E.

In This Issue

Mechanical Erection of Overhead Line Structures for Rail Electrification ... 349
Reducing Radio Interference 352
Electricity and Scientific Advance 353
Readers' Views 355
Monopolies Report on Copper 356
Notes on Wiring, by *Megohm* 357
Changes in Wiring Regulations 358
Airborne Electrics 362
Power Growth in New South Wales ... 364
More Sales Required at Belfast 365
Impulse Testing on a 275 kV Auto-Transformer 365
Overseas News 366
Personalities in the Industry 368
New Literature 370
British Standards 370
Problems and Practice in Engineering ... 371
Equipment for Industry 372
For the Electrical Trade 373
News of the Week 375
Electric Supply News 379
Company Activities 380
Commercial Information 381
Classified Advertisements 57
Index to Advertisers 64

SUBSCRIPTION RATES

United Kingdom and Overseas £3. 3s. 0d. per annum. Canada $9. U.S.A. $9 per annum. Subscriptions are payable in advance and may commence with any issue throughout the year. Overseas subscriptions may be paid to The Electrical Times Limited by banker's draft, cheque, international money order, or by UNESCO book coupons. Single copies price 1s. each.

D

CLEARER SOUND AND VISION

Last week the Statutory Regulations dealing with the suppression of interference to radio and television reception, caused by electric motors and refrigerators, came into force. Coinciding with this was the issue by the British Standards Institution of two documents; one a B.S. Code of Practice (summarised on page 352 of this issue) on the general aspects of radio interference suppression, and the other a revised edition of B.S. 613, which deals with components and filter units. Both these will be welcomed, not least by the dealers and service engineers on whom will inevitably fall the ultimate burden of rendering innocuous appliances which are the cause of complaint; for without complaint no action can be taken. The problem of interference suppression will, however, be aggravated by the introduction in the near future of transmissions in Band III (174 to 216 Mc/s), and the increasing use of the frequency-modulated transmissions in Band II (87·5 to 100 Mc/s). These bands are not dealt with in the present Code, but a revision covering them is expected. Experience in any case of interference at these high frequencies is still limited as far as popular television is concerned, and although the suppression techniques applicable to the normal long and medium wavebands, and the existing television band of 41 to 68 Mc/s are effective, their extension to higher frequencies necessarily remains in some doubt. The general acceptance by the trade of these documents will, however, go far to eliminating many of the existing fundamental sources of interference.

EARTHING COMPLETE

Outstanding among the technical changes apparent in the thirteenth edition of the I.E.E. Wiring Regulations is the revised attitude to earthing. In previous editions, only that part of the earthing circuit which is on the consumers' premises has been provided for: now the whole earthing system, including the arrangements at the supply substation, is taken into account. This is the effect of the new requirement that the total earth-fault-loop circuit impedance shall be low enough to ensure speedy operation of protective gear when wiring or connected apparatus goes down to earth. By this means, a significant step forward in safety has been made, especially in those isolated districts where a metal-piped water system is not available, and where a metallic connection between consumer's earth point and supply substation neutral is not possible. In such localities previously high earth-electrode resistances could render of little value the earth-continuity-

conductor measurements which the Regulations demanded as a check on earthing effectiveness. But although avoiding such dangers, the new logical all-in approach to earthing will bring new problems to the contractor, for his testing can no longer be self-contained. He cannot readily apply the loop test required until an installation is connected to the public supply: and strictly, connection is not normally permitted until compliance with the Regulations has been proved by test. No doubt the necessary compromise will be arrived at readily enough in practice, but the contractor is still left with the problem of ensuring that when, belatedly, the test is applied, the demands of the Regulations will be satisfied. For this purpose, area boards will need to be readily forthcoming with information about their probable contribution to earth-fault loop impedance in those cases where reliance is going to be placed on earth return via the consumer's earth electrode and that at the substation. The margin of doubt that will exist is likely to lead to further extension of the application of earth-leakage circuit-breakers. Contractors, while they may welcome the unambiguous requirements of the new earthing regulations after the previous doubts and complications of measuring earth-continuity-conductor impedance, are likely to feel that the change has materially increased the difficulty of their task.

CABLES IN CONDUIT

A change in the Regulations which should receive unalloyed approval is the extensions in the guidance on conduit capacity. It has always seemed surprising in previous editions, that while maximum number of cables of any one size permissible in each size of conduit were clearly stated, the Regulations did so little to help decide the capacity when a variety of cables were run in one tube. Easy drawing-in was demanded, but at best this was a rough test when applied in the planning stage. The only rational approach to cover such a situation is to fix a maximum proportion of the conduit cross-section which cables may occupy, and the ELECTRICAL TIMES has in the past published curves on such a basis, providing for ducts as well as conduit. Now the Institution, following also the example of some overseas wiring codes, has introduced a system of permitted maximum space factors, to cover all cable enclosures. Accessibility after installation has evidently been the criterion, for whereas in trunking it is permissible to fill 45% of the available area with cables, against the 40% allocated to conduit, for ducts, including those cast directly in concrete, the proportion is dropped to 35%, which seems a somewhat conservative and cautious approach.

SPEEDING RAILWAY ELECTRIFICATION

The fulfilment, within a reasonable time, of electrification plans for the modernisation of British Railways implies the marshalling of all necessary mechanical handling devices. A most important feature is the introduction of auxiliary equipment for the erection of the overhead line structures. Such equipment must necessarily be of specialised design, as apart from its limited function it must also conform with the restrictions imposed by loading gauge, and yet possess sufficient flexibility to deal with differing soil conditions, a relatively wide tolerance of mast positions and varying angles of soil surface. A noteworthy step forward in this field is the erection unit currently at work on the Shenfield-Southend section of the Eastern Region. Under optimum conditions and given full possession of a section of track the unit is capable of completing no less than a mile of masts in some four or five hours. This rate of working can only be achieved by bringing into play the facilities provided by modern mechanical handling of materials and by careful and precise co-ordination between the contractors and the railway authorities. The most important single factor is, however, the obtaining of full track possession for comparatively long periods—a difficult problem with the densely loaded lines of this country. It is, however, a problem which must be solved if the plans for railway electrification are to attain fruition without undue delay and full advantage is to be taken of the rapid working provided by the application of up-to-date engineering techniques.

VERDICT ON FLUORESCENT

Although fluorescent lighting is now fully familiar for commercial if not domestic use, allegations are still heard fairly regularly that it has a bad effect on eyesight. The inference is, that fluorescent lighting makes the job of seeing more difficult than with filament lamps: and the blank denial coupled with references to higher illumination values, which is all the non-specialist electrical engineer usually has to offer by way of answer, is not likely to convince. One of the points of special electrical interest in this year's British Association meeting now ending in Bristol has been the provision of the required answer in suitable and convincing form. This came yesterday, in a paper read to the Physiology section of the Association describing experimental comparisons between the effects of filament and fluorescent lighting on visual performance. The conclusions reached are conveniently unambiguous: a series of tests carried out over a long period has shown that the use of one or other of the two types of illumination does not affect visual performance and, in particular, that the 100-cycle flicker, present more prominently with fluorescent lighting, has no apparent bad effect. That these tests were carried out in a hospital department rather than by lighting engineers adds to their value.

CUT-PRICE STEAM

The C.E.A. and the British Celanese Company have announced an agreement for the supply of steam from Spondon power station to the Company's nearby works that is estimated to save 100,000 tons of coal a year. Thus at last those critics who have urged the use of back-pressure turbines in power stations in conjunction with the use of process steam in industry, have proof that the C.E.A. is indeed willing to encourage such arrangements. But such favourable juxtaposition of power station and steam-using factory is not to be found everywhere, and there are many schemes previously investigated which have proved uneconomic. It is to be hoped that some way will be found of publishing costs and savings of the present scheme reasonably early in its operational history, for they will be of the greatest interest to generation engineers everywhere.

Meteor

The concrete mixing and placing unit, general assembly. Cement and aggregate trucks fore and aft concrete mixing and placing unit. Diesel-electric power plant opposite second mast

MECHANICAL ERECTION OF OVERHEAD LINE STRUCTURES FOR RAIL ELECTRIFICATION

RAPID progress on the fixed part of the electrification equipment for the Shenfield-Chelmsford and Southend (Victoria) is now being made. On the Shenfield-Chelmsford section, the major part of the overhead structures has been completed and stringing of the catenary should be taking place in the near future; on the Southend Branch, progress has been greatly accelerated by the introduction by the contractors, British Insulated Callenders Construction Co., of a new design of mechanical equipment. This specially made gear which was devised in co-operation with Messrs Wharton Engineers (Elstree) Ltd., enables the foundations to be dug, side masts erected and concrete poured at the rate (under optimum conditions) of ten minutes per mast.

Construction Procedure

Previously to the introduction of this equipment, the procedure has been to utilise hand excavation, the concrete materials being dumped and mixed on site. The erection of the masts and grouting in have been separate operations which necessitated later visits to the site. This method was wasteful in concrete, the hole size being determined more by the space required for the man to work in than by the mast supporting function. The new equipment enables all operations to be performed in sequence in one visit. A hole is first bored in the ground by a mechanical auger, a temporary ground frame is placed over the hole and the mast erected over the ground frame. Concrete, mixed on the train is then poured into the foundation hole and the sequence of operations is complete. In this way a construction unit will enter a section of line on which no work has hitherto been done, and in four or five hours will leave, having completed all the foundations and erected all the masts on one side of one mile of track.

The construction unit is divided into three separate parts. First is the earth boring unit drawn by a locomotive which bores the holes as required. The positions of these holes have of course previously been established and pegged, a process which can be carried out while normal traffic is using the line. Following the boring unit comes the steelwork erection unit drawn by a self-propelled steam crane which lifts the masts off their truck and drops them into frames at their correct height and position. Finally there is the concreting unit drawn by a locomotive which fills the excavation.

Earth Boring

The earth borer consists of a boring head driven by a diesel engine and mounted on its own truck. This unit can be made to travel along its own track, to rotate about its axis, to traverse in an across-track direction and to be raised or lowered. The boring shaft can be adjusted to the vertical for any cant of track or position of the radius arm. As the majority of work is carried out with single line working on the adjacent line in operation, the design is such to avoid fouling any passing traffic. The maximum depth of bore is 12 ft, the hole diameter being dependent on the auger being used which can vary in diameter from 2 ft to 3 ft 6 in. The depth of hole required in practice depends on the nature of the soil and the configuration of the surface into which the hole is being bored. For normal working in clay soils depths of 6 to 10 ft are common. The auger can be positioned to a lateral distance of 13 ft 6 in. from the centre line of the track. As far as is known no other augering unit has been made with such comprehensive facilities.

Prior to boring, the operator lines up the drill centre on the location centre peg

After the hole has been completed, a cylindrical metal shell of appropriate diameter made of thin steel sheet is forced into the top of the hole to provide a clean pour and to permit the final concrete block to stand proud of the surrounding soil. The boring unit then moves on to the next site, which is marked by a wooden peg. This peg has been placed in position prior to track occupation by the erection train, and its position is taken from a standard railway datum. The auger boring unit is drawn by a steam locomotive and is not in its present design stage provided with facilities for self propulsion.

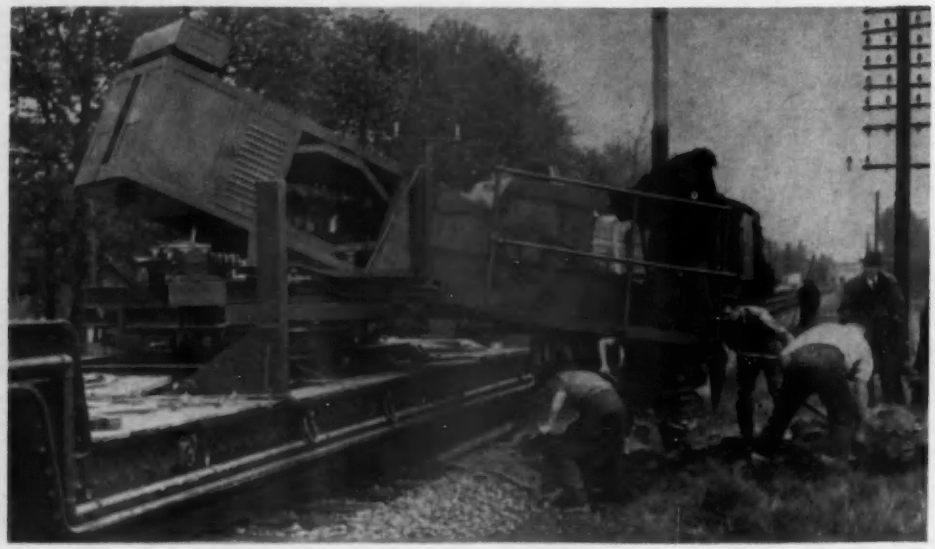
The steel erecting unit which follows is fairly straightforward. On arrival at the hole, a steel ground frame is placed across the excavation and levelled on blocks. The mast is meanwhile lifted by the steam crane from the adjacent truck, and dropped vertically into the hole through the frame. It is then bolted to the frame, and checked for uprightness, after which the bolts are tightened up. The erection unit then progresses forward to the next hole which by now is ready for it.

Finally the concreting unit comes into operation. This is the largest of the three units and consists principally of a power truck, two covered storage wagons, six wagons containing sand and aggregates and the concrete mixing and distribution truck. This latter truck is made up of two electrically driven mixers, each embodying a weigh batcher. Between the two mixers is a specially designed placer unit which is electro-hydraulically operated. This utilises a telescopic jib which enables the concrete, which is poured alternately from each hopper to be tipped easily and directly into the foundation hole. The diesel-electric set used is a Rolls-Royce Merlin 75 unit driving directly a Macfarlane "Magnicon" type self-regulating alternator rated at 95 kVA, 450 V, 3-phase 50 c/s, at 1,500 r.p.m.

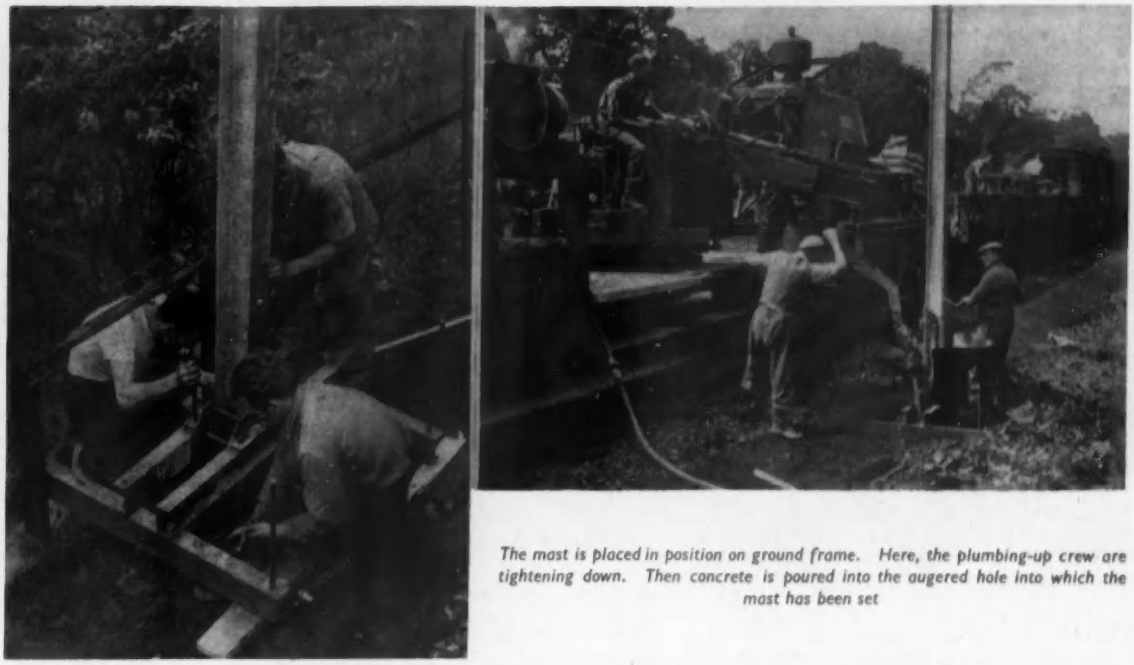
Power Transmission

The power is taken from the diesel-electric truck by cables permanently installed below the cement and aggregate trucks, connections between each truck being made by means of flexible cables and heavy duty 100 amp 3-phase and earth Niphan plugs and sockets. In the power truck are also installed an electrically driven water pump which provides fresh water from a tank truck to the concrete mixers, and an electrically driven compressor which provides the necessary air for operating the compacting vibrators. The power truck is also equipped with a work bench and power points for portable tools, and can thus be used for maintenance purposes.

The power available from the unit is at the moment considerably in excess of that required for the concrete mixing truck, but it must be remembered that this system of working is under continuous revision and improvement. At the moment, for example, the aggregates and cement are transported by hand barrow to the mixers over plank ways



In this picture the auger is operating at normal boring distance from the rails. The spoil is removed by lifting the auger periodically from the hole and is then flung out by centrifugal force. Distribution of this spoil is carried out by hand



The mast is placed in position on ground frame. Here, the plumbing-up crew are tightening down. Then concrete is poured into the augered hole into which the mast has been set

laid along the trucks, but it is envisaged that a conveyor system will be introduced at some future date.

The selection of electrical drive for the mixers was dictated principally on the grounds of consistency of speed, ease of starting and reliability. The motors employed are of course, in view of the working conditions, totally enclosed squirrel-cage three-phase machines.

One of the difficulties associated with the mixers was to utilise standard type units and pack them within the restricted loading gauge of the railway system. The concrete mix itself is extremely critical, being a fast setting rather dry mix. Selection of this mix was based on the desirability of completing the section as soon as possible.

Owing to the shortage of steel, provision has been made for the boring and concreting unit to proceed even if the masts are not available. In this event, the steel erection unit replaces the mast by a rectangular sheet steel structure, of slightly larger dimensions than the mast, which is dropped into the excavation. When the actual masts become available, they are erected in the sheet steel tube and grouted in by hand.

Final finishing is carried out by removal of the top section of the drum, and the application of a weatherproof coating to the top of the concrete foundations and the junction of the mast itself.

Programmed Speed

With the greatly improved speed of working, it is expected that the date of 1st January, 1957 originally set for the introduction of electric services to Southend will be met without difficulty.

It is expected that local electric services on the Shenfield-Chelmsford Section will begin with the summer timetable in 1956. Until the electrification has been carried beyond Chelmsford, however, only the local services between Shenfield and Chelmsford will be operated electrically. These will be covered by extending existing electrified services working between Liverpool Street and Shenfield.

The rate of working is necessarily a function of the time available during which the contractors can occupy a section of track. On this particular scheme, the close co-operation between the Eastern Region and British Insulated Callender's Construction Co. has resulted in periods of up to 6 hours being made available.

The concrete is poured around the mast which is supported by a ground frame. Note the cylindrical external former which shapes top of foundation and retains loose earth

Reducing Radio Interference

B.S.I. ISSUES CODE OF PRACTICE COVERING GENERAL ASPECTS

NOW available from the British Standards Institution, at British Standards House, 2 Park Street, London, W.1, is CP1006:1955, the new Code of Practice on General Aspects of Radio Interference Suppression. This has been timed to coincide in publication date with the coming into force on 1st September of the Statutory Regulations dealing with interference arising from electric motors and refrigerators. It replaces effectively the section of B.S.613:1940 which deals with the use of suppression components but has, of course, been revised and brought up to date. The Code covers the medium and long wave bands, together with the television frequency band (41-68 Mc/s). It is expected that the first revision of the code will be extended to the protection of future v.h.f. sound broadcasting in Band II (87·5 to 100 Mc/s) and television reception in Band III (174 to 216 Mc/s). In the meantime the techniques described for Band I (41-68 Mc/s) can be usefully applied to the higher frequencies.

Origin of Interference

The generation of r.f. noise, it is stated, is due to sudden changes in the current taken by many electrical appliances and these variations lead to r.f. currents flowing in the appliance-supply mains circuit. Associated with these currents were r.f. noise fields and symmetrical or asymmetrical r.f. noise voltages. Propagation could be by direct radiation from the appliance, by conduction from the appliance, along the mains wiring and into the receiver, by re-radiation into the aerial system of the receiver or by re-radiation from wires through loose coupling into receiver circuits.

As the majority of interference arises from noise which has been propagated via the mains, the electrical equipment responsible for it cannot readily be detected by direction-finding equipment. A general guide is given in the Code as to the type of interference emitted from various appliances.

Suppression Methods

Good practice is required both at the source of interference and at the receiver if trouble-free reception is to be attained. The important factor is the height of the receiving aerial which should be erected as high as possible. The use of "mains" aerials is strongly deprecated. Several recommendations as to aerial erection are given. If, despite careful attention to the aerial system, interference persists, improvement may be obtained in some cases by the use of suppressors at the main switch adjacent to the electricity supply meter of the building in which the receiver is installed or at the mains input to the receiver.

Suppressing equipment at the source involves two considerations. One lies in the fundamental design of the equipment, and here it is suggested that manufacturers of appliances which are small and portable, made in large numbers, and are known to be a prevalent interference source, should arrange for the fitting of the necessary suppressors within the appliance at the works. Where the appliance is not a prevalent source of interference provision should be made in the design for fitting suppression components. Design considerations for electric motors, thermostats and "all-insulated" and "double-insulated" appliances are considered.

The second consideration applies to apparatus which has been in service for some time. Here interference may be aggravated by the poor state of the apparatus or of its associated wiring. It is thus wise to check these points thoroughly before any suppression apparatus is fitted. Attention should be given to the bonding and earthing of existing conduit or the metal sheaths of cables.

Basically, suppression at source consists of surrounding the appliance with a metallic screen, and by connection of a suppressor into the mains leads close to the screen to prevent r.f. currents passing into the mains. The screen can in many cases consist of the covering provided by the appliance, and special screening is generally necessary only for industrial, scientific and medical items.

The suppressor itself usually consists of capacitors, which provide a low-impedance r.f. shunt path for noise currents and inductors which present a high-impedance r.f. path. In the long and medium wavebands, capacitors only are generally suitable. They should be connected at points as near to the appliance as possible and should preferably be mounted in or on the appliance itself. Capacitors only are suitable for the great majority of "all-insulated" and "double-insulated" appliances.

The maximum value of the large capacitors used may in some cases be limited by shock considerations; in other cases the internal impedance of the appliance is too low for complete suppression, and in some the small size of capacitor that can be fitted in portable equipment has an impedance comparable with that of the mains. In these circumstances inductors may be introduced.

Complete Suppression

These interference suppressors are not generally efficient on the television frequencies due to inductive coupling across the input and output sides of the capacitors. A better attack is often to use inductors only which possess a fair amount of capacitance.

For complete suppression a suitable long and medium wave band suppressor will need to be combined with a suitable television suppressor. In many instances, particularly with portable equipment, it will not be practicable to embody all these within the appliance or on the appliance. In these cases, the television suppressor should be incorporated within or near the appliance and the long and medium waveband suppressor in the flexible cord to the appliance or preferably in the plug at the end of the flexible cord, or at the mains socket outlet.

The Code deals extensively with the selection of component values and warns strongly of the danger of incorrect connection of suppressors and the importance of correct mains wiring, particularly as far as transposition of line and neutral conductors are concerned. Attention should be paid to the value of earth leakage currents, particularly where fixed appliances are concerned, and the value of the capacitor may be large. Particular care should be taken where relays are involved as the indiscriminate fitting of suppressors can modify relay operation to a significant degree.

The Code ends by giving practical figures for the components of suppressor circuits associated with several types of commonly-used equipment including fluorescent and neon lamps. It is available from the BSI, price 10s.

Electricity and Scientific Advance

WIDE RANGE OF INTEREST AT BRITISH ASSOCIATION MEETING

FROM the electrical engineer's viewpoint, this year's Annual Meeting of the British Association for the Advancement of Science, which opened at Bristol on Wednesday of last week, was not characterised by undue emphasis on this subject, as has been the case in previous years. Electrical interest, however, is by no means absent, being involved with subjects ranging from nuclear power generation to lighting.

Proceedings opened almost on a philosophical note in the Presidential Address, delivered by Sir Robert Robinson, O.M., F.R.S., who chose as his theme "Science and the Scientist," and discussed the distinctions between the two. Science he defined as simply the record of the system of knowledge, and of the conceptions correlating parts of that system. Much of his succeeding address was concerned with the improvement of knowledge and justification of theory by prediction and by the study of a particular topic from two or more distinct sources. All branches of knowledge are included in the definition of science, including "culture," and the scientist is no less a "cultural" person than a follower of the arts. Like the arts, science ignores national and racial distinctions, although contributions from a given people may have a distinguishing characteristic; moreover, it is completely incompatible with authoritarian and dogmatic ideology.

Engineering Section

The engineering section of the meeting was opened by an address by its President Dr S. F. Dorey, C.B.E., F.R.S., of a particularly engineering character. The chairman, having a long association with marine engineering, discussed the influence of the engineer on sea transport and trade. In effect, the address provided a review of the engineering development of cargo and passenger shipping, largely of British manufacture, from the beginning of the nineteenth century onwards, when British engineers pioneered the steam ship to compete with American clippers. Emphasis throughout is on the reduction of weight and fuel consumption of main propulsion units, highlighting the introduction of the steam turbine and oil engine.

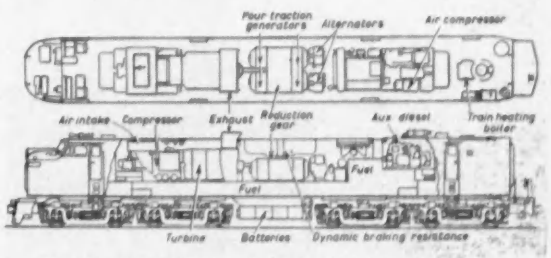
With the Geneva Conference only a few weeks before the Association meeting, reference to nuclear power engineering broke little new ground. Two papers were concerned with this subject, Dr J. V. Dunworth (A.E.A. Harwell) discussing methods of using fuel in a nuclear power programme, and Mr H. H. Gott (A.E.A. Warrington) considering the design and operation of power producing reactors. In fact, Dr Dunworth's paper was a modified version of his paper on Fuel Cycles presented to the Geneva Conference and as this has been reported fully in a recent issue, it is necessary only to comment that it was read at the meeting. Mr Gott, however, outlined the type of work the engineer meets in designing power reactors, and the way that the reactor engineer has to develop a characteristic style in his thinking somewhat different to that of engineers in other fields. This theme was developed by considering some of the factors involved in the design of Calder Hall power station, where a gas-cooled reactor power plant is being employed. The normal skills of engineering required of the designer, quite apart from the special skills associated with reactor physics were seen to contribute considerably to the success of the project. In the Physics Section, a paper by A. H. Cottrell discussed the behaviour of metals inside atomic piles.

Locomotive engineering was featured in a paper reviewing the development of steam, diesel-electric and gas turbine-electric locomotives, presented jointly by J. S. Tritton and J. C. C. Paterson. An extremely comprehensive paper, it points out in discussing steam locomotive testing, that results from the British Railways locomotive testing office at Swindon show the effect of speed on the cost of rail transport. A "King Class" is shown to work at its best efficiency of 7% when hauling loads of 540 to 640 tons at 50 m.p.h., the cost then being 0·05d./ton mile. If the same total tonnage is taken in 500-ton trains at 60 m.p.h., the efficiency drops to below 6% and the cost increases by 50% to 0·075d./ton mile.

With the development of alternative power sources, the greatest challenge to steam in railway operation comes, apart from complete electrification, from the diesel engine with electric transmission, for which America must take credit. In terms of speed the diesel-electric scores over the steam locomotive, and for shunting, is by far and away cheaper. Comparison of ratings of steam and d.c. locomotives is more difficult, in view of the different factors which bear in each case, and particularly since the operational rating must be considerably less than that obtained on a test bed if maintenance is to be realistic.

Comparison of the Santa Fe locomotives, one a 6,000 h.p. passenger diesel-electric and the other 4-8-4 steam, shows the horsepower outputs obtained at the draw bar for speeds up to 90 m.p.h. to be virtually identical. Drawbar pull is, however, markedly different, that of the diesel-electric at starting extending to the limit of adhesion and being about 2½ times that of the steam loco, provided that the motors are not over run for a longer time than their rating will stand in that period. This effect is again reflected in a comparison of hauling capacity, which in diesel-electric locomotives is much higher than steam at speeds up to 30 m.p.h., but at 50 m.p.h. is slightly less than that of steam.

From the financial aspect, capital cost of diesel-electric locomotives is still above that of steam locomotives, although in the U.S.A. the ratio of diesel to steam cost has been brought down to between 1 and 1¼ as a result of rigid standardisation. Operational costs are far more difficult to derive, but on eight U.S. railroads this worked out to figures ranging from 0·96 to 1·82 dollars/loco mile



Layout of the Union Pacific, oil fired gas turbine-electric locomotive described in Mr Tritton's paper

for steam as against a range of 0·66 to 1·12 dollars/loco mile for diesel.

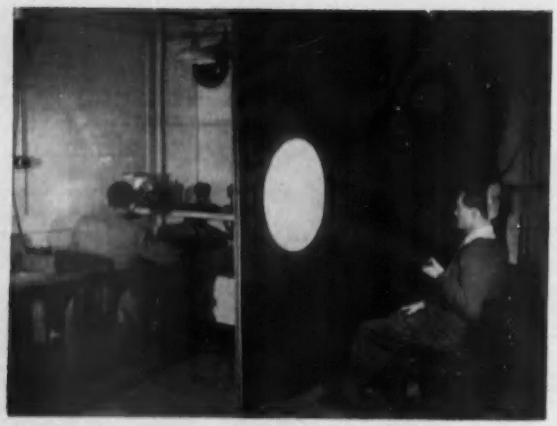
Considering gas turbine locomotives, of which between 30 and 40 are now in service, there is so much variation in design that an actual case was given—the Union Pacific oil-fired gas turbine-electric locomotive, the latest to be placed in service. It is one of a fleet of 25 gas turbine locos ordered successively since the prototype was put into operation in November 1948. In the latest unit, the gas turbine power unit produces 4,500 b.h.p. useful power output at 1,500 ft and 27° C, which is used to power four 1,125 h.p., 900 V d.c. generators supplying eight 550 h.p. traction motors to give a maximum speed of 65 m.p.h. Whereas this locomotive is oil-burning, considerable British effort is being devoted to developing a coal-burning gas locomotive on the "dry boiler" principle, and it is hoped that the new locomotive working on this principle will be on trial next year.

To conclude the papers from the engineering section come two concerned with the acceleration of nuclear particles to high energies. From C. W. Miller came an impressive account of the linear accelerator, describing the development of equipments providing protons up to 50 MeV, and electrons up to almost 1 GeV (=10⁹eV). For high energies above a few MeV, "indirect" acceleration, using an accelerating radio wave, has to be employed, but the energy possible would seem to be unlimited whilst large output currents, and hence power, can be provided with negligible radiation loss. The other paper, by J. B. Adams, was concerned primarily with acceleration to high energies in machines in which the path taken by the particles is orbital. Their development was reviewed, describing the construction, initially, of the cyclotron, from which was evolved the synchro-cyclotron, synchrotron, and its latest development, the alternating gradient synchrotron. This is designed to accelerate protons to about 25 GeV, the highest yet although it is still considerably below the ultra high energies which characterise the cosmic particles from outer space.

Lighting and Vision

In the physiology section, yesterday's meeting was given over to a discussion on lighting and vision, with four papers given by workers and engineers on this subject. Mr H. C. Weston, F.I.E.S., opened the session by dealing with human responses to varieties of lighting, with particular emphasis on the conditions of lighting desirable for various purposes on physiological and psychological grounds.

To find desirable values of illumination, by experiment, for the immense variety of practical visual tasks is itself impracticable, and hence work was directed at finding a fundamental method of assessing requirements. To this end, it was realised that the visibility of any object depends, chiefly, upon its apparent size, and its difference in luminance or colour from contiguous surfaces or background. By determining experimentally how illumination has to be varied according to the magnitude of these universal characteristics to give satisfactory facility of vision, universal basic data was provided from which the illumination for any practical visual task could be computed.



Mr Stevens' test arrangement employed for the work on visual acuity

The second paper, by W. R. Stevens (G.E.C.), was concerned with visual acuity itself, describing experiments repeating and extending Lythgoe's work. For the work, the same test object as that used by Lythgoe was used—a Landolt broken circle—a black image of which was presented to the observer on a small white background, except where an attempt was made to assess the effect of coloured rings on coloured backgrounds. Results of the work show that the largest factor affecting visual acuity, apart from the luminance of the test object itself, is the luminance of the small immediate background to the visual task. By choosing the luminance of the background correctly, relatively large increases in visual acuity can be secured up to test object brightnesses of the order of 100 ft. Beyond this value up to about 1,000 ft, visual acuity remains substantially constant, and beyond this luminance it tends to fall.

A brief paper by W. F. Floyd discussed effects of filament and fluorescent lighting on visual performance, describing tests made to determine whether the differences between filament and fluorescent lighting affect performance in any way. Despite the contentious arguments which have sprung from the use of fluorescent lighting, the tests showed quite conclusively that there are no grounds for the belief that the colour and flicker of fluorescent lamps affects visual performance.

The importance of speed of recognition, apart from ability to recognise details, already mentioned by Mr Weston, was referred to again by J. G. Holmes (Holophane) in discussing lighting and the visual confidence of road users. One function of vehicle or street lighting is to evoke a motor response in threading a safe way through a pattern of signals, obstructions and impending collisions —a task which involves both instinctive reaction and judgment. Lighting can make a real contribution to safety, by promoting security and relieving mental strain, in giving the essential information clearly and with the right emphasis. To this end, experiments have shown that coloured light penetrates fog no better than white, but may lower brightness sufficiently to reduce glare; white headlamps are better for the driver and no worse for any one else; better vision is given by dipped headlights on approaching cars than sidelights only; flashing lamp direction indicators take much longer to recognise and interpret than semaphone indicators; and improved street lighting makes little difference to speed but reduces accidents.

Among other papers of indirect interest to the electrical engineer may be noted a series in the Physics Section devoted to combustion, in which Dr A. G. Gaydon discussed the structure of flames, Dr F. J. Weinberg presented a strikingly illustrated paper on the study of flames by optical methods, and Prof M. W. Thring, with Dr C. Hulse, considered the part played by luminous radiation in furnace heat transfer. Later, in the same section, Dr V. E. Cosslett presented a comprehensive account of electronmicroscopy. At a joint meeting of the Education and Engineering Sections, three papers, by Sir Ben Lockspeiser, Mr H. Ree and Dr J. E. Richardson, considered the possible impact of automation on education.

READERS' VIEWS

Correspondents writing under a pseudonym are asked to submit their names in confidence to the Editor

Earth-Free Situations

I HAVE read the correspondence on the above subject with considerable interest, but had not intended to intervene in the discussion. However, Mr Robinson's comments in your issue for 25th August have stirred me to action, and I sincerely hope that the wise Wiring Regulations Committee does not take him seriously.

I am firmly convinced that indiscriminate earthing can be a greater menace than the occasional omission of an earth connection. I am afraid that earthing is becoming something of a fetish with some people—connect an earth wire and all will be well—when we know quite well that there are so many factors militating against effective protection that one might almost doubt if earthing is *ever* worth while, except, possibly, in industrial installations where real mechanical jobs can be made. A recent Home Office Report, "Electrical Accidents, 1953," records four fatal accidents caused because equipment *was* earthed in otherwise earth-free situations; had the appliances not been earthed no accident would have occurred.

Why, in particular, all this fuss about earthing lighting fittings? In the great majority of cases these are erected in good earth-free positions, and there is no need to lay traps in cases where the electrician has switched the neutral instead of the phase. In any case, we cannot effectively earth fluorescent lighting fittings, as the choke prevents isolation by the fuses, and they *stay* live, as well as all the earth circuit in connection with them. When recently in a bank manager's office (not for the usual reason I might say) we were startled to see burning pitch dripping from a fluorescent fitting and which set fire to papers on his desk; I am certain that many fires have been started from this cause, and I can give chapter and verse for a few.

In contrast to Mr. Robinson, I look forward to the day when we shall not so slavishly require everything earthed, but will study individual requirements; we need to come down to earth ourselves on this subject.

T. C. Gilbert,
FOLKESTONE, KENT.

[*Mr Gilbert's letter is dated before the publication of the 13th Edition of the I.E.E. Wiring Regulations.* ED.]

D.C. Tests for Stator Coils

THE article on page 499 of 24th March, 1955, issue of ELECTRICAL TIMES is titled "D.C. Tests for Stator Coils—American Claims Shown False." A review of this article indicates that this is based on a partial picture of what Americans are doing with d.c. testing.

Though based on I.E.E. paper S-1771, January, 1955, by R. T. Rushall and J. S. Simons, your article implies a more sweeping condemnation of d.c. testing than the original paper you quote. This letter is written with the expectation that you will give the more general American viewpoint (this includes Canada) a hearing in the English technical press, since you have seen fit to head your article with the sweeping statement "American Claims Shown False."

There are several ways that d.c. testing can be used to advantage on both new and old machine windings. A.C. testing has long been employed as only a dielectric withstand or proof test. The values used for such proof tests are somewhat arbitrary, having been based on experience, with the usual a.c. voltage test value for new windings being, in this country, twice normal plus 1,000 V. The purpose of such established withstand voltage tests is to demonstrate a certain order of voltage withstand level and to seek out insulation which might have a lower level due to marginal design, faulty construction, poor materials, or damage in assembly.

D.C. voltage testing is being widely used in the U.S.A. as a withstand voltage test on both new windings in the factory and on older windings in service. It is widely used both as a substitute, and as an alternate test, replacing or supplementing the conventional a.c. dielectric withstand test. In addition to the withstand purpose of d.c. testing, many investigators are recording and using the additional information that may be obtained from current leakage for studying dielectric characteristics. It is this part of d.c. testing that is experimental and controversial. Another unsettled and controversial point is the ratio of d.c. to a.c. voltages to be used for test. The value of 1·6 at one minute which was suggested for trial use is not intended for all purposes. There are numerous ratios depending on the objectives of the particular test and other conditions.

The Westinghouse Electric Corporation has employed d.c. over-voltage testing as a maintenance tool for several years. Your attention is called to A.I.E.E. Technical Papers No. 51-125, 51-127 and 51-151. These refer to the employment of direct voltage overpotential testing without any attempt at forecast or prediction. Under this programme the use of the d.c. over-voltage test merely demonstrates that an insulation in service on a large generator will withstand a certain specific level of operating voltages because it has successfully withstood a d.c. over-voltage test for a specified time. Nothing more is sought nor implied by this test. Westinghouse provides a maintenance engineering service to users which includes such d.c. over-voltage tests. (See A.I.E.E. No. 56). Under this programme, in the last six years, more than 15 million kW of large high-voltage generators rated at 11 kV and above have been tested in service with direct voltage. Usually 13·8 kV machines are tested for 1 minute with 30 kV d.c. A few machines of this group failed the direct voltage test. When the failed coils were removed and examined, it was found in every instance that there was thermal, mechanical, or electrical damage that had existed prior to the test; and that a d.c. over-voltage test merely sought out the area of weakness, detecting it so that it could be repaired before an operating failure might occur. *Of this large group of machines so tested in service with direct voltage in the last six years, no machine which has passed this test has subsequently failed in operation.*

Another outstanding example of the widespread use of direct voltage testing in the United States of America has occurred at the Westinghouse Electric Corporation's East Pittsburgh Plant. Since 1950 direct voltage testing has been used for the preliminary testing of the new windings of large high-voltage machines rated at 11 kV and above. These are the tests made for quality control in the early stages of winding installation in the factory. These preliminary d.c. tests are made after the coils are placed in the slots. Coils are tested as individuals or groups before and after the coils are wedged, roped and connected. These are not the final acceptance tests as specified by the American Standards Association (A.S.A.—C50), as a.c. dielectric tests are the final acceptance tests.

In the last six years more than 18 million kW of large high-voltage machines have been tested in the factory with d.c. by Westinghouse in East Pittsburgh during manufacture. Many of these machine were tested two or three times so that accumulated experience with such d.c. testing is quite large. The tests have been found to be quite discerning of low quality coils and coils that have been physically damaged. These tests in no way attempt to predict dielectric break-down level, as they are simply withstand dielectric tests. The success of this programme has fully justified the continuation of the test in the factory, and its extension to other types of windings, especially in the lower voltage ranges.

As a result of this widespread experience with direct voltage testing by Westinghouse and other manufacturers, as well as many users, both in the factory and in service, the A.I.E.E. and the I.S.A. are taking steps to give official sanction to the use of direct voltage testing as an alternative acceptance test for new windings. The current revision of A.S.A.—C50 now carries a permissive paragraph authorising the use of direct voltage acceptance testing for new windings of large machines where agreed by user and manufacturer. (This has been recommended, but is not yet finally approved as an American Standard.)

Your particular attention is called to the Johnson-Clokey A.I.E.E. Technical Paper No. 53-306 (Johnson and Clokey), where leakage-voltage characteristics of insulation were studied with respect to dielectric strength and to the Stevens-Johnson A.I.E.E. Paper No. 54-265 (Destructive A.C. and D.C. Tests on Two Large Turbine Generators). In both of these papers it is pointed out that non-destructive forecast of machine insulation breakdown is possible, but not certain.

In fairness to the philosophy of d.c. testing and to the supporters of it in America, it is suggested that you should correct the impression created by you in the ELECTRICAL TIMES. The implication is that all Americans are advocating the use of d.c. testing for forecasting dielectric strength of windings. This is not the case, but d.c. testing has been used successfully in order to demonstrate that certain voltages can be withstood and as a practical means for weeding out weak or damaged insulation.

Graham Lee Moses, FELLOW A.I.E.E.,
WESTINGHOUSE ELECTRIC CORPORATION,
EAST PITTSBURGH, PENNSYLVANIA, U.S.A.

Car Battery Deterioration

YOUR correspondent "Motorist" (25th August) is correct in believing that ultimate failure of many car batteries is due to the filling of the sediment space by active material shed from the plates (especially the positive) and the causing of short circuits across the bottoms of the plates. However, vibration is not the only cause; shedding is fundamentally caused by the expansion and contraction of the active material during discharge and charge. Excessive shedding is caused by overcharge or over-discharge, the latter in terms of ampere-hour output and not high current discharge for starting, in which the ampere-hour output is very small.

Most batteries are designed with sufficient sediment space so that, when full, the amount of active material that must have been lost by the plates would cause the performance of the battery to be so poor as to be of little use anyway. There is, therefore, not much to be gained by removing the sediment even if it could be done satisfactorily. Certainly the battery should not be tipped upside down with the plates in position as this is far more likely to shake sediment where it will cause a short circuit than it is to remove one.

Shedding as a cause of ultimate battery failure is becoming more noticeable now that batteries are generally lasting longer. When wood separators were used many batteries failed prematurely, but since micro-porous p.v.c. separators have been used separator failure has been virtually eliminated, and the full life of the plates is now obtained. Even the effects of shedding can be delayed by the addition of glass wool pads against the faces of the positive plates.

This is now almost a standard feature in commercial vehicle batteries and is available in the highest grade car batteries sold at a premium price.

R. L. Walker,
CHIEF ENGINEER, PETO AND RADFORD,
DAGENHAM.

Monopolies Report on Copper

TRADING arrangements for the supply and export of certain semi-manufactures of copper and copper-based alloys are the subject of a report of the Monopolies Commission published on Monday last. Included in the "semi-manufactures" covered by the report is copper wire as used in the manufacture of cables and electrical equipment.

In the report it is stated that there are over 140 concerns in the industry, and that over 70 of them, accounting for about three-quarters of the goods investigated, belong to one or more of twelve trade associations. Ten of these associations co-ordinate many of their activities through the British Non-Ferrous Metals Federation. All the associations fix minimum prices for the sale of the goods with which they are concerned.

The Report goes into considerable detail concerning the High Conductivity Copper Association, amongst others, emphasing the association's concern to prevent the use of rough rod or rough strip in an unfinished condition. It is stated that the High Conductivity Copper Association has special terms for soft cable wire to cable makers.

Varied opinions are recorded as having been expressed by purchasers about price fixing, by no means all of them opposing it. Much the same story applies to the varied arrangements in the trade for discounts and rebates.

The report includes an extensive section on costing and profit ranges for various types of semi-manufacture, and then proceeds to a summary of the case put forward by the British Non-Ferrous Metals Federation.

The conclusion reached by the Monopolies Commission is that the fixing of common minimum prices in this industry is, and may be expected to be, against the public interest. The Commission recommends that all minimum price arrangements in the home market should be abrogated and that each manufacturer should be free to determine the price at which he will sell. It is made clear, however, that in the opinion of the Commission, the average level of profits in the industry has not been unreasonable, although comfortable.

The Commission also recommend the abandonment of a number of incidental practices which they consider to be against the public interest, including aggregated quantity rebates and "loyalty" rebates. Arrangements with overseas manufacturers are considered to operate in general against the public interest.

In a statement issued after publication of the report, the British Non-Ferrous Metals Federation states that the industry does not agree that its practices are against the public interest. It continues "the Commission's conclusions are in line with the sweeping recommendations in their general report on restrictive business practices, which the Government did not accept." The statement assumes that the Government will not act as regards common prices until the matter has been given general consideration.

notes on wiring

by Megohm

IT is pleasing to note the increasing use of what we know as "consumers' units." There are many makes and types on the market today, and a detailed summary of these would use up more space than I am allocated, but certain of these are really worth consideration by the contractor.

Consumer Control Units

The build-up of a consumer unit varies with the requirements of the installation, but in general consists of a sealing box, a double-pole main switch and fuses as required. By the use of the micro-gap switch (a.c. only) and single-pole cartridge fuses with solid neutral busbar, it is possible to house all the control gear in quite a small box. A pleasant change indeed from the cumbersome gear used for domestic installations in pre-war years. These units can be obtained with either rewirable or cartridge-type fuses, and where the latter are used they should be coloured in accordance with B.S. 1361:1947.

One unit which is particularly attractive to the consumer has a test lamp incorporated with a rotary switch. By turning the switch to the circuit number the fuse is automatically tested. This facility, combined with the simple method of replacing fuses and neat appearance, makes this unit very popular indeed. I should like to see some firm produce a miniature circuit-breaker, small enough to be fitted into a consumer's unit of the type described, for I feel sure that m.c.bs. are ideal for domestic purposes. I realise that m.c.bs. are already used in fuseboards, but the fuseboards are, in my opinion, too big for the small house.

I have, on many occasions, used an all-insulated unit suitable for separate control of the lighting and power. This unit is particularly well made, very robust and with clean lines. Even where the consumption is registered on one meter, this unit is extremely useful and has entries at the top, bottom and back. Ample room is available for connecting up and an attachment is available for concealing the meter(s) tails.

Bathroom Lighting

Greater efforts are being made to get the housewife interested in fluorescent lighting in the home. Four new lighting fittings are introduced by a well-known firm in this connection, but I was more interested in the tactical approach to the male members of the family. This is in the form of a shaving cabinet with fluorescent lighting which, it is claimed, is so arranged that it provides the most satisfactory lighting for shaving. The cabinet is made of wood with a high gloss enamel finish and provides ample room for toilet requisites. The switch start control gear for the two 1½ ft 15 W fluorescent tubes is housed in the upper compartment. The tubes are mounted vertically and the diffusing cover is made in a single unit which slides into position over the cabinet. The lighting will also be adequate for general illumination. A very useful and handsome addition to any bathroom but, I warn you, rather costly. Unfortunately I did not have a really good opportunity of examining this product closely, and could not determine if there were any metal parts which could be handled.

Mention of such a piece of electrical equipment in a bathroom raises the old question of safety. If this cabinet has metal parts which can be touched and could become alive, then precautions must be taken to ensure against the possibility of electric shock. Where possible all conduit and other metal parts of the electrical installation should be completely concealed in walls and floors or otherwise screened so that they cannot be touched.

If this is not possible, an earthing strip should be securely fixed to all metal conduits, water pipes and other metal in the bathroom and the strip connected to earth. This will ensure that all metal in the bathroom (other than conductors) remain at the same potential. These requirements are covered by I.E.E. Regulation 1002A.

Earthing Clamps

I note with satisfaction that a manufacturer now offers a complete range of earthing clamps to B.S. 951:1948. Four clamps are included in the range to cover B.S. conduit sizes 1 to 10. These clamps are of robust construction and it is impossible for the earth wire, which is always under tension, to pull out. The clamps have been tested by research laboratories and the tests showed a wide range of safety margin on all sizes of conduit. Each size of clamp can be fitted to two or more conduit sizes and a good feature is the very few parts involved in using these clamps.

Practically every domestic installation relies on an earth clamp for its earth connection and very often this is of inferior manufacture. Very often, too, it is merely installed in a makeshift fashion.

I feel sure that many earthing arrangements would not stand close inspection and all too frequently the connection is made at a position which is not prominent. Why not ask contractors to show on the circuit list, which *should* be attached to or near to the fuseboard, the position of the earth connection? I feel that if this were done, when a test of the installation was being carried out it would encourage the person making the test to examine and test the earth connection also.

Electric Kettle

Electric kettles are quite common but here is one with a slight difference. This one is for use in a car and operates from the 12 V car battery. The makers claim that it "uses very little current to boil one pint of water."

I have, however, seen many a red-faced motorist working furiously on the patent spirit stoves and have often thought what a boon such a kettle as I have mentioned would be. If any one of my readers own such a kettle, I would be interested to hear more. The price of the kettle is 39s. 6d.

(Megohm prepared these notes before the appearance of the 13th edition of the I.E.E. Wiring Regulations.)

CHANGES IN WIRING REGULATIONS

TECHNICAL REQUIREMENTS OF 13th EDITION ANALYSED

LAST week it was possible only to summarise the general form of the newly-published 13th edition of the I.E.E. Regulations for the Electrical Equipment of Buildings, and to give some notes on the new Part 1 of the Regulations. This week we have prepared for readers a detailed summary of changes in Part 2, which in the Regulations is entitled "Means of Securing Compliance with Part 1."

Revision of the Regulations has been very thorough, and many detailed changes have been made which are noted in the tables at the end of this article. There are certain major changes, however, which need fuller discussion, and these include, in particular, earthing, ring circuits, requirements for the installation of cables and conduits, conduit capacity and cable ratings.

Earthing

The new regulations regarding earthing present the greatest change in the new edition. All requirements of resistance and impedance of earth continuity conductors now become subsidiary to new "basic requirements for earthing" (Reg. 406). This demands that the earthing arrangements in a consumer's installation shall be such, that on the occurrence of a short circuit between phase and earthed metal, a current corresponding to three times the rating of the fuse protecting the circuit or 1½ times the setting of the overload circuit-breaker can flow so that the faulty circuit is made dead. Alternatively, an earth leakage circuit-breaker must be provided.

This new requirement means, in effect, that a limit is put on the impedance of the loop circuit: supply authority transformer—phase conductor—consumer's earth continuity conductor—earth (or supply cable sheath)—supply authority neutral-earth connection. What this limit is depends on the rating of the consumer's main fuse. For a 240 V supply and a 60 amp main fuse, the total impedance must be 1·3 ohms or less to the distribution board. Note that this is impedance, not resistance. From the far end of a sub-circuit protected by a 30 amp fuse, a loop impedance of 2·7 ohms would be permissible.

To check for compliance with this new Regulation, it is recommended that each final sub-circuit shall be tested by means of an earth-fault-loop impedance tester of the current injection type (Reg. 507). In this type of tester a low voltage is applied between neutral and earth-point, so that a current of convenient value circulates. The current and the voltage are measured, and the impedance calculated from the ratio voltage/current. It is recommended in the Regulations that the test current should in all cases approach 1½ times the rating of the sub-circuit concerned, with a maximum of 25 amps.

If this method of testing is used, separate measurement of the impedance of the earth continuity conductor usually becomes unnecessary. However, if a separate test is required, the Regulations suggest methods of carrying it out which avoid most of the difficulties associated with the requirement, introduced in the 12th edition, that impedance rather than resistance should be measured. The basic method is to use low voltage alternating current to give a current of 1½ times the sub-circuit rating, and a cable of known resistance to connect the two points between which a test is required. Current and voltage are measured and the somewhat unorthodox value of (voltage/current less known resistance), if less than one ohm, indicates a satisfactory earth continuity conductor.

If a lower value of current is used where steel conduit provides the earth-continuity conductor, the value found for impedance calculated as above has to be ½ ohm; while d.c. testing is acceptable if it is ascertained that no choke is connected in the circuit, and if the resistance of the earth continuity conductor is ½ ohm or less.

In view of the new approach to earthing, it is not surprising to find in the new Regulations extended attention to earth-leakage circuit-breakers. The notes to Reg. 1006 (12th edition) which previously offered recommendations on the subject of these, are promoted to the status of requirements as Reg. 410. It is of interest to note that provision is made for a combined voltage-operated and differential-current earth-leakage circuit-breaker.

"Earth-Free" Abandoned

Previous editions of the Regulations have made special provisions for "earth-free" situations—defined as those in which there is no likelihood of an electric shock to earth from any live metal. In the thirteenth edition this concept seems to have been abandoned entirely. In future, exposed metal work, subject to a few rigidly defined exceptions, must be earthed. Changes that follow include the withdrawal of recognition, for the purposes of the Regulations, from 2-pin plugs and socket-outlets. The special proviso that in earth-free situations, the earth-contact tube of a socket-outlet need not be connected, also disappears.

Ring Circuits

Extensive rearrangement of the section of the Regulations dealing with ring circuits as permitted under exemptions to the 12th edition Reg. 201C, should clarify the question of ways of using such circuits. Basically the main requirements are unaltered, though permission has been added for the use of 30 amp socket-outlets in extra-low-voltage circuits in industrial installations.

In detail, there are some changes (Reg. 114B). Fixed appliances fed from a ring circuit may be protected by circuit-breakers as an alternative to fuses, and where spurs are taken from a ring circuit, only one fixed appliance may be fed from each spur.

Spurs from ring circuits have been the subject of many queries in the past, and one new requirement is that "spurs shall be connected to a ring circuit in socket-outlets or in suitable joint- or junction-boxes." This obviously bears on the much-debated question of whether a spur can be taken off the terminal of the 20 or 30 amp fuse protecting the ring circuit.

The new regulation is more specific than the old on the form the ring is to take. The conductors that form it must be unbroken when they pass through socket-outlets or joint- or junction-boxes, or if they are cut, the full provisions of Reg. 208, dealing with joints in cables, have to be fulfilled.

Finally a note to Reg. 114 deserves attention. It states that the regulation is based on the assumption that cables are not installed in a bunch of more than four single-core cables or two twin cables.

Cables, Conduits and Ducts

A major re-arrangement has been made in the section of the Regulations dealing with methods of wiring. Whereas the former classification of requirements was mainly by system, it is now by hazard to be guarded against, with relatively few special requirements for each wiring method. However, the net effect is not very great, and it is dealt with largely in the tables that follow.

New feature of the conduit capacity regulation which many will welcome is introduction of the concept of space factor, defined as the ratio of the sum of the effective overall cross-sectional areas of cables forming a bunch to the internal cross-sectional area of the conduit, ducting, etc., in which they are installed. For conduits, where the tables forming part of the Regulations cannot be applied, the maximum space factor is to be 40%; for ducts 35%, and for trunking, 45%.

In the tables dealing with cable ratings, the most notable change is in the extended use of rating factors to provide for various groupings of cables. This will provide a more gradual variation of current rating with number of cables bunched than was previously available.

A form of cable run which has come into common use since the preparation of the 12th edition of the Regulations is the concrete duct cast *in situ*. The 13th edition takes specific account of this development, and provides that the minimum thickness of concrete or screed surrounding the completed duct is to be ½ in. Rubber insulated and taped and braided cables and unsheathed p.v.c.-insulated cables are not permitted to be drawn into such concrete ducts.

Outside Wiring

A new Regulation (229) deals with the situation where a consumer's installation has to be extended from the main supply point to separate buildings. Permissible forms of wiring are listed, including metal-sheathed and served underground cables, cables in conduit run overhead without joints between buildings, cleated wiring (gaps up to 10 ft) catenary systems, and suitable cables supported on insulators.

TABLE 1.—PRINCIPAL CHANGES FROM 12TH TO 13TH EDITION OF I.E.E. WIRING REGULATIONS

Regulation (12th Edn.) and Subject.	Particulars of Change in 13th Edition
106 Omission of consumers main fuses.	New requirements are agreement to supply authority in all cases and sub-circuit fuses, etc., to be within reach of main switch (Reg. 105).
108A I.C. Switchboards	Special requirements for siting omitted.
109 Distribution fuseboards.	Omitted.
113A switches in 2-wire installations.	Switches in a 2-wire installation connected to a supply having neither pole earthed must now be of the double-pole linked type (Reg. 107B).
114A Ratings of conductor and protective device.	A circuit-breaker with an inverse-time characteristic is to be regarded as a fuse—i.e. the cable rating may be equal to the operating current of such a c.b. (Reg. 108).
114C Ratings of conductor and protective device.	Disappears in detail. In particular, permission for 50 ft run of branch conductor before fuse, etc., is removed.
115A Presence of medium voltage.	Fixing unshrouded terminals 6 ft apart no longer sufficient precaution on its own (Reg. 109).
201B Final sub-circuits below 15 amp.	The requirement for at least one lighting sub-circuit per 1,000 sq ft is changed from a requirement to a recommendation (Reg. 113, Note 2).
201 C & D and exemptions. Final sub-circuits above 15 amp.	Many changes in detail. See accompanying notes (Reg. 114).
202A Protection of final sub-circuits.	Circuit-breaker with inverse-time characteristics regarded as a fuse for cable rating purposes (Reg. 108).
202 C & D Size of conductors.	Reference to aggregate current of points supplied has been removed (Reg. 203).
202F Special installations.	Specific provision for smaller cables in special circumstances has been removed.

Regulation (12th Edn.) and Subject.	Particulars of Change in 13th Edition.
210 Electric signs.	Special requirement for multipole linked switch omitted.
305 Earthed-concentric wiring	Limitation on voltage drop where earthed-concentric wiring is used on d.c. are omitted.
306 A & B Maximum and minimum conductor sizes.	Maximum and minimum sizes are not now included—but all cables are required to conform to B.S.
309–311 Cable colours.	Some minor additions (Reg. 206 and Table 7).
312A Cable terminations.	Lower limit of 0·01 sq in. for compulsory provision of mechanical clamp or soldering socket is removed (Reg. 207).
313 B & C Joints in cables.	Joint box no longer specifically required for soldered joints in t.r.s. or p.v.c.-sheathed cables—nor for paper-insulated or varnished cambric insulated cables.
313D Mechanical connectors.	Detailed requirements for boxes round mechanical connections in cables, removed.
314 Joints in earthed-concentric wiring.	Provision that joints in outer of earthed concentric wiring must not increase resistance of conductor changed to recommendation that they should not (Note to Reg. 208A).
315D Cable in lift shaft.	Aluminium-sheathed cable added to permitted types (Reg. 209B).
315I Cables in ventilating ducts.	Direct prohibition on cables in ventilating ducts other than those designed to accommodate them, omitted.
401 Bare conductors.	The use of bare and lightly insulated conductors is now limited to five specific applications (Reg. 215A). There are new provisions for rising mains—see Table 2.
401I Bare conductors.	Requirement that 18 in. of insulation shall be removed from v.r.i. before joint with bare conductor is reduced to 6 in. (Reg. 211C.)

Regulation (12th Edn.) and Subject.	Particulars of Change in 13th Edition.
403E Metal-sheathed cables.	Permitted distances between supports where cables are not likely to be disturbed are extended. Requirement that cables run parallel to joists shall be attached to their sides is omitted (Reg. 210E).
403F Metal-sheathed cables.	Requirement that floorboards shall be fixed with removable screws when cables are sunk into floor joists, omitted.
403G Metal-sheathed cables.	Specific requirement for joint box omitted.
403H Joint boxes for Al-sheathed cables.	Joint boxes of metals other than aluminium or aluminium alloy may now be used with aluminium-sheathed cables, subject to certain precautions (Reg. 213C).
404 F & H T.R.S. and p.v.c.-insulated cables.	Changes similar to those for 403E and F above (Reg. 210E).
405D Conduit runs.	Changes have been made in basis of calculating number of cables permissible in conduit. Absolute prohibition on drawing cable round more than two 90 degree bends is omitted. See notes above (Reg. 218B).
405H Conduit runs.	Where conduits are sunk into floor joists, use of removable screws on floorboards is no longer required.
405K Conduit resistance.	Maximum value of conduit impedance is recommended as 1 ohm, but this is no longer a "must". This change follows from the new regulations on earthing, discussed above (Regs. 219A and 407B).
405N Conduit runs.	Requirement that in metal conduits, outgoing and return cables should be drawn into same conduit, is now confined to a.c. systems (Reg. 219B).
409 Wood casing.	Aluminium-sheathed cable prohibited in wood casing. Restrictions on number of cables bunched in one groove and on size of casing installed, omitted (Reg. 227).
410D Earthed-concentric wiring.	Specific requirements for use of earthed-concentric wiring omitted.
411 Medium-voltage circuits.	Specific requirement for heavy-gauge screwed conduit to enclose circuits operating at above 250 V is omitted: but requirement for complete enclosure in earthed metal remains (Reg. 11).
413B Flexible cords.	6 amp limitation on flexible cords is omitted (Reg. 226).
608C Socket-outlets in floors.	Special provision for protecting socket-outlets sunk in floors becomes recommended practice rather than a "must" (Note to Reg. 312B).
612C Fuses.	Minimum rating permitted in Exemption (i) does not now apply except specifically to 14/·0076 in. flexible cord. (3 amp for fuse in plug, 5 amp for fuse in dis. board.)
613B Voltages above 250V.	In place of specific requirements where portable appliances working at more than 250V are used, there is a call for "special consideration" of such circumstances (Reg. 110 note).

Regulation (12th Edn.) and Subject	Particulars of Change in 13th Edition.
701B & C Control of heating and cooking appliances.	Heating appliances are now required to be controlled by a linked switch which breaks all supply conductors instead of only the live conductors, as formerly; unless the heating elements are so screened that they cannot be touched (Reg. 314A). In the case of a bathroom, specific mention is now made of the type of switch which is operated by an insulating cord (Reg. 314B).
701D Thermostats in neutral.	Special permission to wire thermostat contacts in the neutral conductor is now omitted (Reg. 107A).
702B Generators and motors.	Use of pressurisation for operation of rotating machines in inflammable conditions recognised (306B).
702C Generators and motors.	Minimum distance from inflammable matter reduced to 6 in. (or 12 in. vertically) (Reg. 307A).
702E Generators and motors.	Specific requirement for means to prevent oil from motor dripping on to wooden floor, omitted.
704C Protection of motor circuits.	If a starter gives excess-current protection to cables between starter and motor, the rating of the fuse protecting the final sub-circuit may be up to twice the rating of the cable used (Reg. 317B).
705B Oil-filled apparatus.	Special provision for draining oil from oil-filled apparatus now required where oil capacity is 20 gallons (against 50 previously) (Reg. 307E).
706A Resistors and woodwork.	Separation distances reduced to 12 in. vertically, 6 in. any other direction (Reg. 307A).
708 A & B Auto-transformers.	Permission to use autotransformers fed at above 250V in conjunction with electric discharge lamps, omitted. Autotransformers may not now supply any portable appliance, unless the autotransformer is contained within it; nor any circuit operating at below 15V; nor any socket-outlet (Reg. 318A & B).
712B Earthing electrode water boiler.	Requirement for bonding sheath and armour of cable to boiler shell now general for all electrode water boilers (Reg. 320D).
714 Single phase elec. water boilers.	Connection of boiler shell to supply neutral now required in certain circumstances (Reg. 323).
810 Power factor correction.	Where power-factor-correcting capacitors are provided in discharge lamp circuits, the specific requirement for separate p.f. correction for each part of a final sub-circuit controlled by a separate switch, is omitted.
813 Earthing, exposed metalwork on discharge lamps.	Specific exemption from earthing requirements of metal clips or clamps used to support discharge lamps, omitted.
904 Auto-transformers.	Autotransformers with an open-circuit voltage up to 1·5 kV may now be connected to a.c. 2-wire circuits (12th edition, 1 kV) (Reg. 711).
1001 Earthing metalwork.	The approach to earthing is changed considerably. See notes above.

Regulation (12th Edn.) and Subject.	Particulars of Change in 13th Edition.
1001A Ex. (i) Earth-free situations.	Exemption from earthing of metalwork in earth-free situations is omitted. "Earth-free" situation is no longer defined in the Regulations.
1001A Ex. (viii) Earthing of lighting fittings.	This exemption from earthing of shades, reflectors, etc., is now limited to cases where the fittings use filament lamps, the floor of the room is non-conducting, and the fittings are at such a height that they cannot be readily touched and are out of reach of earthed metal. Metal chains suspending lighting fittings (if not in contact with a flexible cord) are now exempted (Regs. 403, iii and ix).
1002D Switches in bathrooms.	Switches and methods of apparatus control in a bathroom must now be out of reach of a person in contact with the bath (instead of sitting in bath, 12th edn.) (Reg. 405B).
1003 Earth continuity conductor.	The basis of earthing is essentially changed in the 13th edn. See notes above. The 1 ohm impedance limit remains in certain circumstances, but not as a requirement.
1004 Joints in conduits.	Requirement that joints in cable sheaths or conduits used as earth continuity conductors should have current-carrying capacity not less than that of conduit or sheath itself, is replaced by requirement that joints should be soundly made and protected where necessary against corrosion (Reg. 407B iv).

Regulation (12th Edn.) and Subject.	Particulars of Change in 13th Edition.
1005A Earth connections.	It is no longer essential to use earthing means made available by the supply authority (terminal or cable sheath). An earth electrode is an equally acceptable alternative (Reg. 409).
1008D Earthing leads.	Requirement that earthing leads should be connected to metal sheath rather than armour of a cable is omitted.
1009A Buildings of steel-framed construction.	There is now a firm requirement that accessible structural steelwork should be bonded to the earth continuity conductor (Reg. 404).
1108 Maintenance report Form B.	In place of impedance of earth-continuity conductor, the form now records the earth-fault-loop impedance or an opinion on the effectiveness of the earth-leakage circuit-breakers (Reg. 510 note).
Section 12. Private Generating plant.	Now an appendix to regulations. There are new requirements for the room in which the plant is fitted, and for fire precautions. (Appendix A).
1306A Types of cables.	Impregnated-jute-insulated cables omitted from types recognised for purposes of Regulations.
1312A Socket-outlets and plugs.	All socket-outlets and plugs must be non-reversible.

TABLE 2.—PRINCIPAL NEW REQUIREMENTS OF 13TH EDITION OF I.E.E. WIRING REGULATIONS

New Regulation and Number.	Summary of Requirements.
112B Final sub-circuits.	The wiring of each final sub-circuit is now specifically required to be electrically separate from that of every other final sub-circuit. This demands a separate neutral conductor for each part of an installation controlled by a separate single-phase switch.
210D Supports for cables.	Cable supported by a self-contained catenary wire not to span a distance greater than that for which it was designed.
212A Protection against fire or explosion.	If a run of conduit must pass from an area where there is danger of fire or explosion, to a safe area, a flameproof sealing box shall be inserted where the conduit enters the safe area.
213B Protection against corrosion.	Aluminium-sheathed cables installed in underground pipes or concrete ducts shall be provided with a corrosion-resistant finish complying with B.S.480 Part II.
215Bii Bare conductors.	Conductors and insulators in rising main and busbar systems are required to be of adequate strength to withstand the electro-mechanical forces that may be set up by the prospective short-circuit current.
219C conduit.	Conduit systems not intended to be gas-tight shall be self-ventilating, and drainage outlets shall be provided at any points in the installation where condensed moisture might otherwise collect.
221 Non-metallic conduit.	Unless joints are made by screwing, the ends of every length of conduit must be firmly anchored.

New Regulation and Number.	Summary of Requirements.
223C Duct and trunking system.	All entries to finished ducts or trunking shall be so placed as to prevent the entry of water, or be protected against such entry.
223E Ducts.	Bends limited in fabricated ducts as follows: round ducts, inner radius of bend not less than 2½ o.d. of duct: rectangular ducts—2½ times minor dimension of duct. For concrete ducts, bends shall be of inner radius not less than 4 times the diameter of the completed duct.
223F and G	New requirements for cable capacity of ducts and for cable types for concrete ducts—See notes above.
229 Wiring between buildings.	Requirements for systems to be used. See notes above.
306Bii Inflammable or explosive condition.	Where risk may arise from an inflammable concentration of dust, a dust-excluding totally-enclosed type of construction may be used as an alternative to F.L.P. and other permitted constructions.
324A–F Electric fence controllers.	Special provisions for electric fence controllers. They must be free from risk of mechanical damage, not normally fixed on a telecommunication or power line pole, earthing arrangements must be separate from those of any other circuit and not more than one controller may be used for any fence.
324G Devices for deterring birds from roosting.	Requirements for danger marking, and provision of fireman's emergency switch.
507 Effectiveness of earthing.	New regulation for test procedure discussed in notes above.

Airborne Electrics

S.B.A.C. SHOW ACCENTS MINIATURISATION

IT is natural that the highlight of the annual air display, staged at the Royal Aircraft Establishment, Farnborough, by the Society of British Aircraft Constructors, is the flying displays, but for the electrical engineer the exhibition of aircraft equipment merits careful study in its own right. This year's show, which opened on Monday, is again well worth a visit, and as usual, the contribution from the electrical industry is prominent.

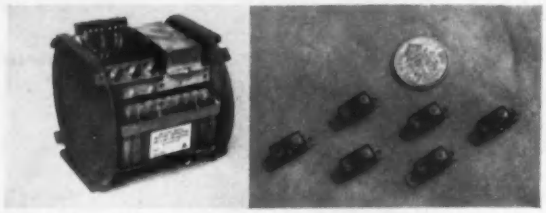
Considerable emphasis this year is placed on the development of turbo-starter units employing a liquid monofuel as the prime source of energy capable of being fed to an inaccessible starter position; whilst the starter itself can be readily increased in power output as engine design progresses. The British Thomson-Houston Co. show a new starter of this type, employing iso-propyl nitrate as its fuel and which, being a true monopropellant unit requires no air or external agent to initiate decomposition. Also shown by B.T.H. are high energy ignition units, an electronic ignition tester for multi-cylinder aero-engines, together with displays of aircraft motors and auxiliary generating plant. Rotax also show a new i.p.n. turbo-starter, in which combustion is initiated by electrically igniting a controlled mixture of iso-propyl nitrate and air. This is shown together with aircraft equipment which includes a single pole h.r.c. circuit-breaker employing two breaks in series and rupturing 10 kA at 11 V or 12·5 kA at 28 V at 60,000 ft altitude.

On the English Electric stand, special emphasis this year is given over to a.c. aircraft electric systems employing the Sundstrand constant-speed drive which, powered from the main propulsion engines, drives a 40 kVA alternator. Apart from this centrepiece, other exhibits feature components of electrical systems, including a latched type, 200 V, 120 A, t.p., 400 c/s circuit-breaker of rupturing capacity 4,000 A, and transformers of 2·4 kVA and 5 kV rating employing "E" cores rolled from special grain orientated steel to minimise weight and iron losses. Plessey show two machines, a 4 h.p. motor of one minute rating for high starting torque applications; and a rotary transformer supplying 500 mA at 6 kV d.c. and 30 mA at 48 V d.c., from a 27 V d.c. input. For dynamic balancing gas turbine rotors, impellers and other rotating parts weighing from 75 to 1,500 lb, and having lengths of 60 in. and diameters of 36 in., E.M.I. Ltd. feature their heavy-duty balancing machine, the latest and largest of the range manufactured. Sensitivity is such that forces displacing the c.g. by distances between 0·00002 in. and 0·06 in. can be readily and precisely measured.

Ground Power Units

Ground power units play an important part in modern airline operation, and four such units are shown by Murex Welding Processes Ltd. Particularly interesting is their self-propelled 112/28 V unit, providing, at the higher voltage, an output of 240 A continuously or 700 A for engine starting purposes and, at the lower voltage, 45 A or 70 A. From Partridge Wilson and Co. are "Davenset" ground

In our heading illustration is depicted the aerial system for Decca's new compact 3 cm radar. Below, from left to right, are seen a 6 kW airborne generator by Rotax, Marconi's sub-miniature direction finder and the B.T.H. high energy ignition unit for gas turbine engines



Left is seen Venners' lightweight silver-zinc accumulator in a power pack for guided missiles, whilst the "Gravinette" temperature control switch is shown right

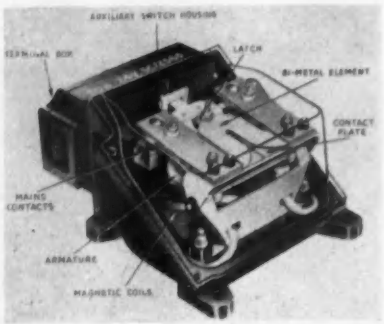
rectifier units for both starting and servicing purposes for mixed fleets including the Viscount. They are mains operated and have full voltage and current protection. Westinghouse feature a wide variety of metal rectifiers, mostly for light current applications, although considerable interest will be centred in their aluminium-based rectifier developed for aircraft d.c. power supplies.

Apart from a comprehensive display of communications equipment, Standard Telephones and Cables indicate their "Sentercet" engine starter rectifier units by a scale model. The unit is of a type specifically designed for use with the Viscount. Three aircraft power rectifiers are also shown using an aluminium-based assembly for light weight.

Aircraft Batteries

It is but a short step from rectifier units to batteries, which form an important part of aircraft electrical equipment. Specially produced under Ministry of Supply Development Contracts is to be seen Chloride Batteries' 6 MNA17, an ultra-lightweight 12 V, 4 Ah, battery of the unspillable type for use in operating canopy-jettison gear, v.h.f. equipment and the like. Of special interest on Peto and Radford's stand is a new 24 V, 25 Ah battery —type 12-ECM 13 V—which embodies the novel feature of ventilation. Another battery firm, Oldham and Son, have the type H, 24 V, 40 Ah military battery for emergency jet engine starting together with its civil version which is dimensionally interchangeable with the American AN 3150 unit. A feature of the Venner display is their lightweight silver-zinc battery, of which the H40/24 is used to supply both power-operated controls and general electrical requirements in the "Gnat" light jet fighter.

Instrumentation and control equipment is well to the fore, and under this generic heading is seen a wide variety of equipment. From the production aspect the Ferranti electronic control unit for machine tools is of particular interest, being suited to the production of small quantities and eliminating the need for templates or special jigs. Machine tools are controlled by a computor output derived from an input specifying the shape of the product in terms of the curves involved and the machining information. Automatic regulators for the control of voltage, current and similar parameters are shown by J. Stone and Co. (Deptford), their display featuring hermetically-sealed types suitable for operation through a wide range of ambient temperatures and pressures. In contrast, the Graviner Manufacturing Co. show miniature temperature control switches. Known as "Gravinettes," they are designed to work between −60° C and +300° C, and with a rating of 2 A at 28 V d.c., or 1 A at 250 V a.c., they are only 1¼ in. long by ⅛ in. wide by ¼ in. high.



The series B overload circuit-breaker shown by Thorn Electrical Industries

One of the 60 ft high apron floodlight towers in front of the S.E. face passenger landing building at London Airport. Mounted on the towers are G.E.C. floodlights specially designed to Air Ministry specification each containing a 1000 W "Osram" projector lamp

From S. G. Brown Ltd. comes the first production model of a master reference gyro for aircraft, a particularly important development. The Aviation Division of S. Smith and Sons, which embraces a number of instrument firms, is featuring a new flight system for instrument flying in large aircraft in which the functions of sixteen instruments are condensed into eight standard-sized panel-mounted indicators. Marconi Instruments give prominence to their industrial X-ray apparatus TF1555A, which offers non-destructive testing of welds and cast components for flaws. Among instruments proper, Sangamo Weston display several recent developments including a number of hermetically-sealed instruments housed in 2 in. circular flangeless cases of which the model S178 is a miniature homing indicator. Elliott Bros. have a fuel flowmeter system for use in either single or multi-engined aircraft, giving indication of the rate of fuel consumption of each engine singly and of the total rate and quantity consumed.

The electric and hydro-electric section of the Dowty Group feature a working model of a complete stepped control system and a new 3-position magnetic indicator. Teddington Aircraft Controls exhibit a useful range of pressure switches whilst a selection of two- and three-way solenoid-operated relay valves and miniature solenoid-operated valves is shown by Electro Hydraulics.

Lighting is represented by a number of developments, including a novel demonstration by Thorn Electrical of their console and instrument panel lighting, featuring their "Plasteck" method which employs red light transmitted through a transparent plastic base. From the G.E.C. is seen a new apron floodlight containing a 1 kW projector lamp in a special 20 in. diameter lightweight housing. Featured by Aldis Bros. is their recently-developed "Long-range" signalling lamp, a new design giving considerably improved performance over their earlier model. A new 1 kW quartz tubular infra-red lamp, developed for use in connection with kinetic heating problems, is being shown by Philips Electrical.

Aircraft Cables

In the realm of cables, electrical installation and other materials, B.I.C.C. concentrate on "Pren" and "Nypren" aircraft cables, whilst Telcon feature both cables and aircraft metals. Also exhibiting are W. T. Henley's Telegraph Works Co., who have aircraft cables of all types including h.f. cables, winding wires, flexible cords, and the "Solon" electric soldering irons.

For the many construction and installation applications Rawlplug offer their "Rawlnut" expanding rubber device. The uses of "Bakelite" laminates for jig and tool making are well shown, whilst I.C.I. are giving considerable display to "Fluon" their polytetrafluorethylene product. Fibreglass shows yarns, tapes and sleevings for insulation purposes, and a variety of insulating materials can be seen on Ashdowns' stand. Aircraft castings form the centrepiece of Renfrew Foundries' and Birmingham Aluminium Casting Co.'s displays, whilst Pyrene feature new applications of their metal-finishing processes of which one is the use of "Bonderite 'SS'"—a process to facilitate the cold forming of stainless steel and heat resistant alloys—in the production of components from Nimonic.

Also on show is a display of Hellerman's solderless cable terminals, which are available in either individual units for hand crimping or in strip form for automatic crimping on a large scale, and are increasingly important in view of the use of aluminium conductors. The Standard Insulator Co. offer a complete range of moulded rubber grommets to B.S. SP40 together with a standard range of 500 sizes in natural and synthetic grades. T.I. Aluminium, and their associated firm Accles and Pollock, feature, of course, steel and aluminium tubing, the latter firm showing a new development of seamless stainless flexible tube. Precision steel castings are also featured by Firth Vickers, whilst Sparklets, Tufnol, Turner Bros. Asbestos Co., Henry Wiggin and Co., and W. T. Henleys, are also exhibiting in this section.

Electronic Equipment

No description of the S.B.A.C. would be complete without reference to the wide variety of electronic equipment on show. A new item is Ekco Electronics' airborne search radar unit, designed for detecting dangerous cumulonimbus clouds and associated turbulence up to 120 miles away. Plessey introduce a new v.h.f. radio telephone unit which provides 1,750 channels, made in single and multi-channel forms for ground to air operation, with a normal transmitter output power of some 10 W, which can be increased to 150 W.

One of the features of Salford Electrical Instruments' stand is a new variable frequency audio oscillator, covering a frequency range of 50 c/s to 50 kc/s in three switched ranges, whilst the Marconi group introduce their sub-miniature automatic direction finder. Believed to be the smallest and lightest equipment of its kind, it weighs only 20 lb all-up, and is primarily intended to meet all the major operational requirements of a radio compass in fighter and small civil aircraft. Decca present a new, compact ground 3 cm radar set giving medium range air surveillance with solid vertical coverage up to 25,000 ft out to some 45 miles on small jet aircraft, and to 75 miles on large transport aircraft. A number of working models of electronic equipment demonstrate applications of Mullard valves in the aircraft industry.

Power Growth in New South Wales

SOMEWHAT belatedly the Report of the Electricity Commission of New South Wales for the year ended 30th June, 1954, has now come to hand. This is the first Report covering a full year's operation of the Commission and shows a surplus for the year of £446,261. Total income for the period was £27,047,786 against an expenditure of £26,601,525. The Commission's accounts over the period concerned do not include the operations of the Electric Light and Power Supply Corporation which, while it operated under the Commission's direction, retained its separate identity. Electricity sales totalled 3,758 million kWh representing an increase of 12% over the previous year. The maximum load of 887·5 MW was met on the Commission's system on 17th June, 1954.

During the year additional units were installed in the Commission's stations to a capacity of 151 MW bringing the total installed capacity up to 1,104 MW. At the same time considerable progress was made toward the installation of a further 729 MW of generating plant which will be brought into service progressively over the next few years.

In the period covered by the Report, eight new substations were placed in service with a total transformer capacity of 132·5 MVA. Additions and alterations to existing substations resulted in a further capacity of 80·6 MVA, the combined increase representing 22·7% of the installed capacity at the beginning of the year.

In extending the country transmission system, 98 miles of 66 kV 2·5 miles of 33 kV and one mile of 6·6 kV lines were placed in service and in the metropolitan area 5·56 miles of 132 kV line and 3·96 miles of underground cable were completed.

Progress was made toward the completion of other transmission projects, particularly in respect of the 132 kV system beyond the metropolitan area, and the substations required for use in connection with the future receipt of power at 330 kV from the Snowy Mountains Hydro-Electric Authority.

The new plant commissioned consisted mainly of two 50 MW sets, one in Pyrmont "B" and the other in Bunnerong "B" power stations together with a 7·5 MW unit at Lithgero. At Port Kembla, a 16 MW unit was installed to replace the unit damaged in service in June 1952. Pyrmont "B" is scheduled for an ultimate capacity of 200 MW in four 50 MW sets. Tallawarra initially is to have four 30 MW units. Lake Macquarie Power Station, now under construction is to have an ultimate capacity of 330 MW composed of three 50 MW and the remainder in 60 MW units. Work has also continued on the Wallerawang Station (ultimate capacity 180 MW) and on the installation of a further 50 MW set at White Bay.

More Sales Required at Belfast

THE statement that "the time has come to promote sales with the utmost vigour so as to postpone the necessity for considering an increase in tariffs" is contained in the Report of the City Electrical Engineer and General Manager of the City and County Borough of Belfast Electricity Undertaking for the year ended 31st March, 1955. This is qualified by the remark that with the present inadequate facilities and personnel available, it would not be practicable to embark on a sales programme commensurate with the development programmes of the undertaking, and that the matter requires urgent attention. The question of sales promotion has been dealt with at length in the City Electrical Engineer and General Manager's Report on Staff Reorganisation, Part II, briefly summarised on page 375 of this issue.

These remarks arose from the financial results of the year's working, which might be considered reasonably satisfactorily, for while costs rose appreciably, the adverse effects were largely offset by improved efficiency of operation and a considerable increase in the sale of units. The full impact of loan charges in respect of the large development programmes in progress and contemplated, and recent wage awards had yet to be felt.

Revenue, after deducting discounts and bad debts, amounted to £2,686,626. Working costs charged to Revenue Account, including the purchase of electricity, were £2,169,844. There was an increase in revenue of £221,657 over that of the previous year, but total costs, including loan charges, increased by £237,208. Gross profit was £516,782. A considerable amount of money had received loan sanction from the Ministry of Commerce, of which the largest single item was £3,208,000 for plant extensions at Power Station West No. 5 scheme. A general increase of about 9% in units sold was shown in all supply categories with the exception of transport which fell by 4·2%.

Engineering

On the engineering side the 110 kV duplicate interconnector between Power Station West and Donegall distributing station in Milner Street, a distance of 3½ miles, was completed, and the first of the two 30 MW turbo-alternators comprising the initial installation at Power Station West was synchronised on 26th September, 1954, less than three years after the first foundation pile had been driven. The second similar machine was commissioned on 10th March, 1955. All the major contracts have been placed for the extensions to the station which will comprise 3—60 MW sets with 9—220 klb/hr boilers.

At the East Power station some 500·5 million units were generated and 44 millions at the West station, 40,200 units were generated at the East Bridge Street station to give a total of 545 millions.

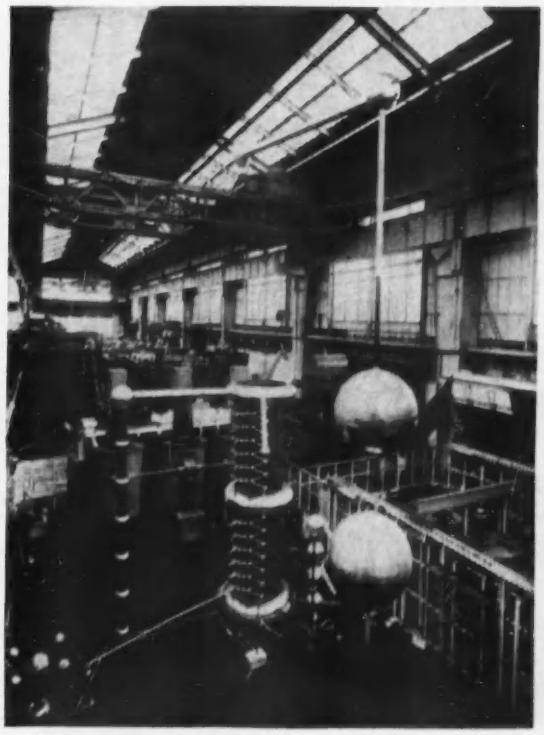
IMPULSE TESTING ON A 275 kV AUTO-TRANSFORMER

IMPULSE type tests have been successfully performed on a complete 120 MVA, 3-phase, 275/132 kV auto-transformer at C. A. Parsons and Co., Ltd., Heaton Works, Newcastle upon Tyne. This unit is one of seven 275 kV transformers at present under construction for the Central Electricity Authority.

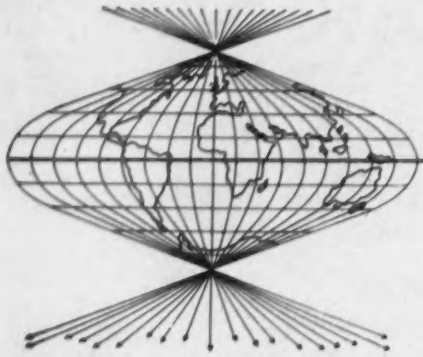
The type tests comprise, in addition to calibrating shots, three full waves at 1,050 kV and two chopped waves at 1,210 kV applied to the 275 kV bushing on two phases, whilst on two phases of the 132 kV side three full waves at 550 kV and two chopped waves at 635 kV were applied.

The testing arrangements are shown in the illustration. In the immediate foreground the 150 cm sphere gap can be seen together with the impulse generator and its associated potential divider. The impulse generator has a rated voltage of 2½ millions in 12 steps and has an output of 60 kW-seconds. The generator is specially designed to achieve a high voltage efficiency; that is, the generator has good regulation characteristics and is capable of producing a standard impulse wave form of 1/50 micro-seconds—within specified tolerances—on very large e.h.v. transformers.

This new testing plant designed and constructed by the Electrical Research Division of C. A. Parsons was commissioned in June 1954. In the construction adopted for the impulse generator, all the separate stage condensers are oil immersed and are housed in two bakelised paper tanks which form the main structure of the generator embodying the trigger gaps, the inter-stage and other resistors. One electrode of the rod gap is incorporated in the generator and can be remote controlled. In addition, the generator when not in use can be lifted as a unit outside the test area in a separate steel container which also affords protection during storage.



View of test layout for 120 MVA, 275 kV auto-transformer with sphere gap in foreground and impulse generator in middle distance



OVERSEAS NEWS

A SUMMARY OF IMPORTANT EVENTS

CANADA

Atlin Project

Local inhabitants around Atlin, British Columbia, have approved the proposed large scale hydro-electric project proposed by Northwest Power Industries Ltd., a subsidiary of Frobisher Ltd., at an open hearing locally, the provincial water controller, Mr A. M. Paget, explained that their rights would be protected by the Water Act. A consultant of Frobisher's, Mr J. M. Wardle, outlined the five stages planned, the first of which should be started in 1957. This would involve construction of a temporary dam on the Atlin River to impound the waters of Atlin Lake. The reservoir would first be fed by a one-mile tunnel into Sloco Lake in the south, then by a 10-mile tunnel with a drop of 1,100 feet to the planned power house on the Nakonake River. A 48-mile transmission line would carry the 270,000 h.p. to the Taku River industrial site. Estimated period of construction is two years.

Station Opening

The Rapid II power plant of the Quebec Hydro-Electric Commission was officially opened a few days ago by Premier M. Duplessis. This new 48 MW station on the Ottawa River, had two of its 16,000 h.p. sets installed last year, but the station has now been completed.

BRAZIL

Peixotos Station

Construction work on the Peixotos hydro-electric station, at Franca, in the State of Sao Paulo, is scheduled for completion in 1956. The station will have a generating capacity of 400,000 kW produced by 10 units of 40,000 kW each.

URUGUAY

Further Finance

The World Bank has made a loan in various currencies—mainly Italian lire and Swiss francs—equivalent to $5·5m for increasing electric power supplies in Uruguay. The borrower is the Administracion General de las Usinas Electricas y los Telefonos del Estado (U.T.E.), an autonomous agency of the Government which has exclusive right to provide electricity and telephone services in Uruguay. The loan is guaranteed by the Republic of Uruguay. It is for 20 years and carries an interest rate of 4¾%. Amortisation will begin May 1, 1958. First National City Bank of New York and the Netherlands Trading Society, Amsterdam, are participating in the loan to the extent $654,000. This loan will finance the foreign exchange cost of installing a new 50,000 kW unit, with the necessary boiler and auxiliary equipment, in the Batelle y Ordonez thermal power station in Montevideo. Nearly all the equipment for the installation is being purchased in Western Europe. The turbo-generator is being supplied by Brown Boveri of Switzerland, and the boiler by the Societa Edison of Italy.

U.S.A.

Large Turbines

A contract for four hydraulic turbines which are claimed to rank with the largest in the world, has been placed with Allis-Chalmers Manufacturing Co., of the U.S.A. The turbines, each rated at 137,500 h.p. at 152 ft head, are for the Washington Water Power Co.'s Noxon Rapids hydro-electric development on Clark Fork in north-west Montana. They will be of the single vertical Francis runner, welded steel scroll case type with twin cabinet type oil pressure governors. The first turbine is scheduled to be shipped in the latter part of 1958, and the runners will be of such size that they will have to be designed in several sections to permit shipment.

Magee Bend

Construction of the Magee Bend Dam is to begin in the early part of next year. Estimated to cost $50 millions, the dam is to be built across the Angelina River, about 45 miles from Lufkin, Texas, and will form an artificial lake 40 miles long to provide flood control, water conservation and hydro-electric power. The hydro-electric plant to be installed will have a capacity of 45,000 kW but detailed specifications are not expected until next spring.

AFRICA

Plant Order

Pretoria City Council has awarded a contract for two more 30 MW steam turbo-alternators for the Pretoria "B" power station to the English Electric Co., Ltd., who are thus providing all six 30 MW sets for the station. The first set began operating in 1952 and since then two further machines have been commissioned. A fourth is scheduled for commissioning in 1957. Associated boiler plant consists of ten 210 klb/hr stoker-fired boilers, the steam conditions being 625 lb/sq in., and 825° F at the t.s.v. Boiler plant has so far been supplied by Yarrow (Africa) in association with their parent company in Scotland. Messrs Merz and McLellan are consulting engineers for the "B" power station, fuller details of which were given in our 14 May, 1953, issue.

Another Aluminium—H.E. Scheme

The mainland of French Guinea, West Africa, is the latest suspected source of vast deposits of bauxite, and attention is being turned to a possible hydro-electric source, we gather. The Societe Africaine de Recherches at d'Etudes pour l'Aluminium (S.A.R.E.P.A.), which is partly owned by the French Government and partly by Pechiney and Ugine, the French aluminium concern, have been investigating the possibilities there for about 3 years, and estimate the bauxite reserves at several hundred million tons. Consideration is now being given to the possibility of constructing a hydro-electric station, perhaps at Kaleta on the Konkoure river, of about 650 MW capacity, which would permit the exploitation of bauxite deposits in the Konkoure basin. It is estimated that over 150,000 tons of aluminium could be produced annually, provided a suitable power source is obtained.

IRAQ

Nationalisation Plan

A five-man Iraqi Board is shortly to be appointed to take over administration of the British-owned Baghdad Light and Power Co.'s undertaking which is being nationalised at the end of Sept. next. The Government has decided to retain for five years the services of Entreprise Generale de Travaux, the Brussels concern which has been running the undertaking. It is expected that the proposed agreement between the Baghdad Light and Power Co. and the Iraq Government will be signed within the next few weeks.

INDIA

Good Kanpur Results

Over 212¼ million units were sold by the Kanpur Electricity Supply Administra-

tion, Uttar Pradesh, during the year ended 31 Mar. last, an increase of 7%. The number of consumers has also increased to nearly 35,000. To meet the growing demand, an extension project was undertaken some years ago to add 15 MW of generating plant, together with extensions to the distribution system, at an estimated cost of Rs. 234,25 lacs. As some of the generating plant in the Riverside power house is over 25 years old plans for new equipment, estimated to cost Rs. 1,28,33,000, has been approved by the State Government, Mr K. C. Gupta, the general manager of the Administration, reports. It is evident that the K.E.S.A. intends to continue to be able to meet demands for power.

Cost of Conversion

The conversion of Central Calcutta areas from d.c. to a.c. involves heavy expenditure and will take many years to complete, Mr D. H. P. Henderson, chief electrical engineer of the Calcutta Electric Supply Corporation Ltd., has told a meeting of local electrical contractors. Since 1952, when the conversion programme was started, over 3,000 consumers have been changed over from d.c. to a.c. at a cost of approximately Rs. 40 lakhs, of which Rs. 17 lakhs represents the cost of new apparatus given to consumers in exchange for their old d.c. equipment. It cost between Rs. 1,000 and Rs. 3,000 to convert every kW of load services in the Calcutta area, he said, where the total demand for d.c. lighting was around 100 MW.

NEW ZEALAND

Order for Towers

The State Hydro-Electric Department has placed two contracts with an Italian company, S. A. Elettrificazione, of Milan, for the supply of steel towers for transmission lines. The new lines will carry power from the geothermal steam station at Wairakei to Whakamaru hydro-electric station and from the substation at Islington, near Christchurch, to Kikiwa, near Nelson.

Development Work

The Otago Electric Power Board, N.Z., proposes to spend over £223,000 on various works during the current financial year. Of that total £45,000 is allocated for providing a supply in the Deep Stream—Kukerangi area, which will require 88 route miles of line. There are only 58 houses in that area to be given power, and 49 residents have agreed to meet the cost involved, their guarantee amounting to £68 each.

KOREA

Restoration

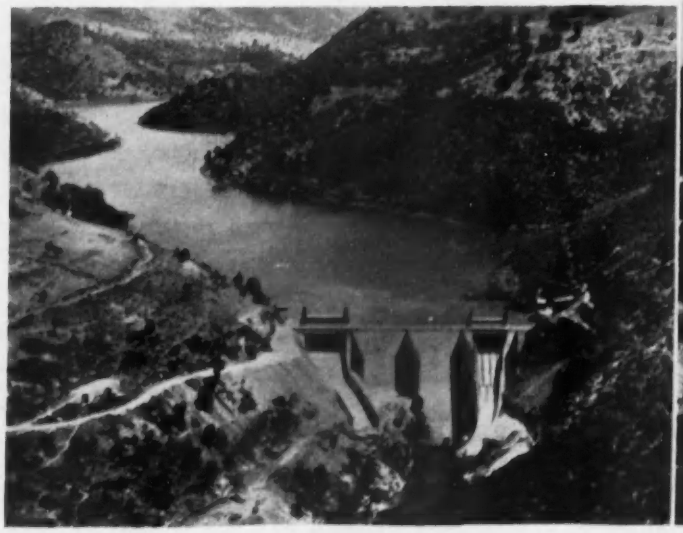
North Korea's largest power plant—which was heavily bombed in the war—has recently reopened, although the report only refers to the No. 6 generator at the Suiho hydro-electric development, which is situated on the Yalu River boundary of Manchuria. The plant has been restored with Soviet assistance, it is stated. The Suiho project, built by the Japanese during World War II, originally had an installed capacity of 800 MW. In the very heavy bombing in June 1952 it was claimed that the generating plant was totally destroyed, the dam hit and the penstocks severed.

JAPAN

Development Fund

A sum of Y36,055 millions has been allocated for work on various projects during the current financial year by Japan's Electric Power Development Co.—a government-owned concern—according to the development fund programme recently announced. Priority is being given to the four projects in Nukahira and Ashiyoro in Hokkaido; Sakuma (Shizuoka Prefecture); and the No. 2 generation plant in Nishi Yoshino (Nara), all of which are expected to be completed during this fiscal year. According to the plan, Y2,701 millions will be diverted to the Nukahira project, Y1,173 millions to Ashiyoro, Y9,902 millions to Sakuma and Y425 millions to the No. 2 generation plant in Nishi Yoshino. Some Y150 millions will also be used to survey the projected power development sites at Kumano River in Wakayama, Nara and Mie prefectures, and at Nabari River in Kochi Prefecture. Meanwhile, President Junzo Kosaka of the Electric Power Development Co., has intimated that electricity generated at the power plant at Sakuma, scheduled for completion in Jan. next, will be supplied to the Tokyo and Chuba electric power companies.

Constructed largely with the aid of Italian war reparations, the Ladhon hydro-electric scheme in the north central highlands of the Peloponnese, Greece, illustrated below, was inaugurated a few weeks ago with its two generators. This 50 MW station, constructed for the Greek Public Power Corporation, utilises the fall of the river Ladhon between the Pidima and Spathari bridges. The dam, shown below, left, is about 108 ft high. The Ladhon scheme has a surface catchment area of 430 sq miles, the river being largely spring-fed. The power station, right, feeds into about 200 miles of 150 kV transmission line supplying the Peloponnese and terminating in the Athens-Piraeus area. This is the second of three hydro-electric projects started in 1951, aimed at providing electricity to large areas of rural Greece



Personalities

IN THE INDUSTRY

Mr C. E. H. Verity, O.B.E., M.INST.C.E., M.I.E.E., M.I.MECH.E., who has been deputy chief engineer (generation station construction) with the C.E.A. since Mar., 1950, is relinquishing the post as from 30 Nov., to join the board of Foster Wheeler Ltd. In recent years Mr Verity has been largely concerned with the C.E.A.'s programme of construction of power stations throughout the country. Prior to 1948 he was for three years chief development and testing engineer (mechanical engineering) of the London Power Co., Ltd., during which time he was intimately concerned with the planning and technical details of the Deptford West, Battersea and Bankside power stations, in addition to extensions to several other stations of the company. Educated at Wellingborough School, Mr Verity received early engineering training at the works of W. H. Allen, Sons and Co., and at the Bedford Technical College. He became an assistant in the Engineering and Contracts Dept. of that company and in 1924 was appointed technical assistant to the chief engineer of the Contraflo Engineering Co. He joined the London Power Co. in 1927, and became head of the Technical Dept. (Mechanical Engineering) of that company in 1931. In 1941 he was seconded for special intelligence duties in the R.A.F., during the course of which he visited the U.S. on five occasions and saw service in N. Africa, Middle East, India, China and the Pacific, holding the rank of Group Captain. More recently he has visited the U.S. and the Continent on several occasions in connection with technical investigations on power plants, and some months ago went to Pakistan and Australia.

The new station superintendent at Hams Hall "C" power station, Midlands Division, C.E.A., is **Mr E. H. Cook,** A.M.I.E.E., who since Nov. 1951 has held a similar position at the Division's Hams Hall "B" power station. Mr Cook has been at the latter station since it was completed in 1942, initially as the shift charge engineer, and subsequently as combustion engineer and deputy station superintendent. Earlier he was boiler house shift engineer at Hams Hall "A" for three years. Mr Cook has served throughout his career with the Birmingham undertaking, starting as a trainee in 1929, and afterwards gaining experience in every section of the power station and completing his training in the control room at Nechells, where he became boiler house shift engineer in 1934.

To succeed Mr E. H. Cook as station superintendent at Hams Hall "B" power station, **Mr J. Paxton,** A.M.I.E.E., A.M.I.MECH.E., has been promoted from a similar position at the Hams Hall "A" station. Like Mr Cook, Mr Paxton has also served for many years with the Birmingham undertaking, although Mr Paxton gained earlier experience in the power station he has held various positions, joined the Corporation Electric Supply Department in 1926 going to the old Summer Lane power station in 1929, and then on to the Hams Hall "A" station when it was commissioned. At the latter station he has held various positions, rising to deputy superintendent in 1941 and station superintendent from 1947.

Sir Summers Hunter, who recently retired as managing director of Richardsons Westgarth and Co., and its subsidiaries, has joined the board of Vent-Axia Ltd.

Rear-Admiral Sir Philip Clarke, K.B.E., C.B., D.S.O., has been nominated for re-election as president of the British Institution of Radio Engineers for the year 1955-56. **Messrs G. A. Marriott,** B.A. (CANTAB.), **L. H. Paddle, J. L. Thompson** and **Professor E. E. Zepler,** PH.D., have been nominated for re-election as vice-presidents.

Mr C. E. H. Verity

Mr E. H. Cook

Mr J. Paxton

Appointed as technical director of Siemens Bros. and Co., Ltd., is **Mr W. H. Grinsted,** O.B.E., F.C.G.I., M.I.E.E., who has been consultant, telecommunications group of that concern, after some years service as chief engineer. Mr Grinsted was with the old National Telephone Co. from 1905 to 1911, following which he joined Siemens Bros. and Co., Ltd., being in charge of the telephone engineering side until 1944. He was awarded the O.B.E. in 1953.

Simplex Electric Co. Ltd. announce the following appointments. These have been made consequent upon a re-organisation of the Creda sales staff covering, in the main, London, Eastern and South Eastern areas: **Mr B. J. Hendy** is appointed Creda heating and cooking sales engineer, London, with special duties concerned with Government Departments, etc.; **Mr J. S. Gurnett** becomes Creda area sales engineer, Eastern, London and Southern Areas; and **Mr K. J. Vicars** is appointed Creda sales engineer, Eastern Area, in succession to Mr J. S. Gurnett; **Mr A. D. Whitaker** is appointed water heating sales engineer in the Midlands, South Wales and South Western areas; **Mr M. A. L. Wingate** is now Creda sales engineer covering the Croydon and Kent area; while **Mr H. E. Wilson's** responsibility for the South Eastern Area remains unchanged.

Mr Roy Burges has been appointed publicity manager of Birlec Ltd. in succession to **Mr J. C. Mantell,** M.B.E., as from 19 Sept. Mr Burges, who read physics at St. Peter's Hall, Oxford, joins his new company from Langley Alloys Ltd. Mr Mantell remains within the A.E.I. group of companies, in which he will take a two years training course at the British Thomson-Houston Co., Ltd., Rugby.

Head of the Electronics Section of the Electricity Division of the National Physical Laboratory, **Dr A. H. M. Arnold,** PH.D., D.ENG., has been appointed to the Readership in Electrical Engineering at King's College, London University. Dr Arnold has been a member of the scientific staff of the N.P.L. since 1926. He gained early training with the Metropolitan-Vickers Electrical Co., Ltd. He was author of a paper on "Testing A.C. Instruments" presented to the I.E.E. in Nov., 1953.

Previously sales manager, f.h.p. motors, Crompton Parkinson Ltd., for five years, **Mr R. V. Powditch,** O.B.E., T.D., A.M.I.E.E., ASSOC.I.MECH.E., recently resigned that position to take up an appointment as

general manager of a new division of Wilkins and Mitchell Ltd. Mr Powditch served an apprenticeship with Clarke, Chapman and Co., and from 1934 to 1938 was sales engineer with Delco-Remy and Hyatt Ltd., after which he joined Crompton Parkinson Ltd. During the war he served in the 6th Airborne Division, ultimately as Lieutenant-Colonel, R.E.M.E., and between 1946 and 1948 saw service with the Control Commission for Germany as principal controlling officer (mechanical engineer) for Hamburg and Lower Saxony. Returning to Crompton Parkinson Mr Powditch was a contracts engineer for a while, before being appointed sales manager (Stud Welding Division) holding that position till 1951 when he became sales manager—f.h.p. motors.

Mr G. P. Belsham has been appointed sole managing director of Brookhirst Switchgear Ltd. Since the end of 1951 Mr Belsham has been a joint managing director of that company, of which he has been a director since 1948. He was, from 1929 to 1940, assistant works manager and from 1940 to 1943 works manager to the Igranic Electric Co., Ltd. He became works manager at Brookhirst Switchgear Ltd. in 1943. It is now also announced that **Mr D. W. Kent** has been appointed sole managing director of Igranic Electric Co., Ltd., and on taking up that appointment he will relinquish his seat on the board of Sentinel (Shrewsbury) Ltd. In addition, **Mr E. Bruce Bail,** C.B.E., has joined the boards of Sentinel (Shrewsbury) Ltd., Fawcett, Preston and Co., Ltd.; Finney Presses Ltd., and Ferrous Castings Ltd. All the above mentioned companies are members of the Metal Industries group.

District commercial engineer for the Central Sussex district of the South Eastern Electricity Board since 1949, **Mr R. L. Howe,** ASSOC.I.E.E., has been appointed to a similar post at the Board's Tunbridge Wells district as from 10 Oct., in succession to **Mr R. E. Gleadow,** A.M.I.E.E., who, as we noted on 21 July, has joined the North Western Electricity Board at Bolton. Mr Howe started with the former Central Sussex Electricity Co. at Haywards Heath in 1939.

Mr E. R. Hilton, B.SC., has been appointed an assistant to the sales manager of the British Materials Handling Division of the Yale and Towne Manufacturing Co., Ltd.

His Excellency Rashid Bey Najib, the Governor of Mosul, accompanied by **Mr J. A. Newton,** chief electrical engineer of the Iraq Petroleum Co., recently visited the B.T.H. Rugby Works. The guests were entertained by **Mr G. S. C. Lucas** (director and chief electrical engineer) and senior executives of the company. They toured the main Works and Lamp Works, and were obviously impressed by the wide range of plant and products. Our photograph, taken on the occasion, shows: front row, left to right: Mr R. M. Grant (manager, B.T.H. Plant Contracts); His Excellency Rashid Bey Najib (Governor of Mosul); Mr G. S. C. Lucas (B.T.H. director and chief electrical engineer); Mr J. A. Newton (chief electrical engineer, Iraq Petroleum Co.); Mr C. K. Bird (manager, B.T.H. Turbine Contracts). In the back row, left to right, are: Mr C. W. Peyton (B.T.H. Export Co.); and Mr J. G. Boddy (deputy manager, B.T.H. Turbine Contracts).

At the B.T.H. Rugby Works

Mr G. P. Belsham

Mr C. W. Bloomfield

Miss M. Bennett

Mr C. W. Bloomfield, who, as we briefly noted last week, has retired from the managing directorship of Hackbridge Cable Holdings Ltd., founded the original business in 1912 and was the first chairman of the Holdings Company. **Mr W. L. Brown,** a director of Siemens-Schuckart (Gt. Britain) Ltd., who, like Mr Bloomfield, has had extensive experience on the administrative side of the cable industry, has been nominated to fill the vacancy on the board.

Miss Margaret Bennett has joined British National Electrics Ltd. She received her domestic science training at the Birmingham College of Technology, was appointed district demonstrator at Worcester with the Midlands Electricity Board, and has also worked in a food manufacturer's experimental kitchens. Miss Bennett will be operating in the Midlands, Southern and South Western Electricity Board areas with **Miss S. Keal,** senior B.N.E. demonstrator.

Mr B. Winsor, who has been outside technical representative for the Midland Electric Installation Co., Ltd., for some years, is relinquishing that position to take up another appointment. **Mr K. Ratcliffe** has been appointed to succeed him, with **Mr A. D. Nock** as his assistant.

Mr R. W. Wrathall has been appointed head of the electrical development section at the National Coal Board's new central engineering establishment now under construction at Stanhope Bretby, near Burton-on-Trent.

Mr H. V. Potter, chairman and managing director of Bakelite Ltd., has intimated to the board that the time has now arisen when he wishes to be relieved of the position of managing director and this is to take effect as from 31 Oct., but he will continue as chairman of the board. Mr Potter became chairman and managing director in 1948. The company at the same time records that **Mr F. J. Robinson** will vacate the position of deputy managing director as from the same date. The board has appointed **Mr G. W. Hodds** as managing director as from 1 Nov.

Mr E. Barnard, C.B., C.B.E., D.S.O., has retired from the position of deputy secretary in the Department of Scientific and Industrial Research, which he has held since 1945.

OBITUARY

Mr C. A. Vandervell, who died on 30 Aug., aged 84, was responsible for many electrical developments in motor cars, including the invention of the small dynamo for car lighting. The business he built up was amalgamated with Joseph Lucas Ltd. some 30 years ago.

Major A. Pam, O.B.E., chairman of the Pressed Steel Co., and other concerns, died on 2 Sept., aged 80. He was also vice-chairman of Hydro-Electric Securities Corporation, Ltd., and a partner in the banking house of J. Henry Schröeder and Co.

Mr H. Hillier, O.B.E., M.I.MECH.E., M.I.MAR.E., who was in control of all design work and technical development of G. and J. Weir Ltd., died on 27 Aug., aged 64.

Mr R. J. Heathman, chief engineer of the Liverpool Corporation Passenger Transport Department since 1945, died on 30 Sept., aged 54. From 1922 to 1935 he was with the English Electric Co., Ltd., where he was responsible for the design of some of that concern's first trolleybuses.

Mr. Geoffrey Ellam, managing director of G. Ellam Ltd., electrical wholesalers of Manchester, died on 2 Sept. aged 78.

NEW LITERATURE

Fundamentals of Transistors

by L. M. Krugman, B.S., M.S., P.E.

WITH the superiority of the transistor over the thermionic valve well established in application where minimum space and power requirements are primary factors, a considerable quantity of literature is now available on transistors for physicists, mathematicians and research and development engineers. Little, however, exists for the technician, or home enthusiast, who is primarily concerned with getting to know the practical uses of these devices in order to exploit them. To this group, primarily, is addressed this excellent work on transistor fundamentals, whilst engineering students, and engineers confronted with the transistor for the first time, would do well to study it. Advanced physical and mathematical concepts have been avoided, the emphasis throughout being on practical application; albeit, with an American approach. The opening chapter deals succinctly with basic semi-conductor physics, as a prelude to considering transistors and their operation. Succeeding chapters describe more fully the operation of earthed base, earthed emitter and earthed collector transistors, then turning to specific application of amplifiers, oscillation and h.f. circuits. An appendix details common transistor symbols. Published by Chapman and Hall, 140 pages, 8 in. by 5¼ in. Price 21s.

Large Scale Electric Cooking

by Ester Purvis

LARGELY at the request of supply authorities, this useful booklet makes a welcome appearance, particularly so in view of the emphasis given at the B.E.P.C. to the commercial catering load. It is largely given over to recipes, but contains useful hints on the maintenance and operation of electrical catering equipment, and general advice, for the non-technical user. The diagram showing a model kitchen layout is particularly helpful. All told, it provides the supply industry with useful publicity material to attack this important group of consumers, particularly with school feeding centres which are increasing their use of electrical equipment. Second edition, published by the Landwood Distributing Co., 18 Cowcross St, E.C.1, 33 pages, 7¼ in. by 4¼ in. Price 3s. (Quantity prices on request.)

Electric Wiring (Domestic)

Ed. by E. Molloy.

A PRACTICAL book for a practical man sums up this valuable little book, which, in this new edition, incorporates the considerable revision necessary for any book dealing with methods of electrical installation. Information, moreover, has been brought into line with the 12th edition of the I.E.E. Regulations and the 1954 supplement thereto. Primarily intended for the electrician and wiring technician, it provides, by way of introduction, a brief and simple outline of the theory of wiring circuits and then delves straightforwardly into the practice of the work, considering the determination of cable and accessory ratings and, in detail, the fitting and wiring of switches and fuse-boards, lighting points, socket-outlets and individual electrical appliances. There is a comprehensive survey of wiring systems, followed by detailed considerations of the installation of conduit and surface systems. The provision of safe and efficient earthing is discussed, and a chapter on installation testing concludes a volume, which for its low price, is a well worth while investment. Fifth edition, published by Newnes, 268 pages, 7¼ in. by 4¾ in. Price 8s. 6d.

Valves for A.F. Amplifiers

by E. Rodenhuis.

DESPITE its title, this handy volume is concerned as much with a.f. amplifiers themselves as with their valves, since the book is intended for that class of engineer/technician, whether professional designer or home amateur, who prefers to design and construct his own equipment rather than rely on that which is commercially available. It is not, however, an instruction manual for a number of cut-and-dried amplifier circuits but, in contrast, offers suggestions and hints so that the designer can incorporate his own particular features, and build amplifiers from a circuit diagram only, rather than from a wiring layout. Its opening chapters are concerned with general hints on amplifier construction and discussion of the types of valve used for the various stages. Four specific a.f. valves made by Philips are then considered intimately, together with hints on practical uses of valve data generally. The succeeding chapter deals briefly with circuits and components, as a prelude to the latter part of the book which is given over to detailed descriptions of eight amplifier designs. Published for Philips Technical Library by Cleaver-Hume, 147 pages, 8 in. by 5¼ in. Price 10s. 6d.

BOOKS RECEIVED

Electro-Technology, by M. G. Say. Presents in concentrated form the electrotechnical basis of phenomena important in light and heavy current engineering, a textbook and reference work. Published by Newnes, 167 pages, 8½ in. by 5½ in. Price 10s. 6d.

Transistors and Other Crystal Valves, by T. R. Scott. Presents for engineer users a picture of their present development, discussing potentialities and limitations. Published by Macdonald and Evans, 258 pages, 8½ in. by 5½ in. Price 45s.

BRITISH STANDARDS

General Recommendations for the Radiographic Examination of Fusion Welded Joints in Thickness of Steel up to 2 in. *B.S. 2600:1955. Price 4s.* The work resulting in this standard was undertaken at the request of the British Welding Research Association. The increasing use of X-rays and gamma-rays for the examination of welded joints in a wide variety of constructions has made it desirable to issue some recommendations of a general character giving guidance on the application of these methods. The standard is divided into the following four sections: (1) the general recommendations for all types of radiography within the scope of the standard; (2) X-ray techniques for general application; (3) X-ray techniques for special applications; (4) gamma-ray techniques.

Capacitors for Connection to Power-Frequency Systems. *B.S. 1650:1955. Price 5s.* Superseding B.S. 1650:Part 1: 1950 and Parts 2 and 3, which were published in 1952, this revised publication is intended to bring the previous editions into closer agreement with the recommendations of the International Electrotechnical Commission. Intended to apply primarily to capacitors having mineral-impregnated paper dielectric, covering continuously-rated capacitors (for power factor correction purposes) and intermittently-rated capacitors (for motor starting), large series capacitors rated at 1 kVAr or greater do not, therefore, come within its scope, although smaller series capacitors, such as may be used in some fluorescent lamp circuits, are covered. Main changes in the new edition are increases in the permissible overload current for capacitors rated at not less than 1 kVAr, and a classification of the routine and type test clauses. Among the additional items which have been introduced are a stability test, and a test for the efficacy of the discharge device. The new definition of "rated insulation voltage" may in some cases be different from the rated voltage of the capacitor dielectric.

Gramophone Records, Transcription Disk Recordings and Disk Reproducing Equipment. *B.S. 1928 : 1955. Price 6s.* Superseding the 1953 edition, this revision retains for the most part the dimensional features specified in the earlier publication, but its presentation differs, whilst its scope is considerably extended to include 45 r.p.m. records and specifications for recording and reproducing characteristics for all types of disk recordings.

Copies of the above Standards may be obtained from the British Standards Institution, British Standards Hse, Park St, W.1, at the prices stated.

PROBLEMS AND PRACTICE

In Engineering

Every engineer has a story to tell; why not tell yours on this page? We welcome contributions to this feature, and those published will be paid for at our standard rates. Problems which are encountered and overcome in day-to-day maintenance or installation of electrical plant; useful methods and techniques developed for specific jobs, or current practices, all make instructive reading for others. We will also consider for publication problems requiring an answer. Sketches are often helpful and need only be rough, as they will be redrawn before use.

Reversed Winding

I ONCE installed a ½ h.p., 480 V d.c. compound wound motor complete with starter. The motor had to be bedded down on the floor, and was to drive a tiny line shaft. After installation some peculiar faults developed. When the motor ran on no load at 1,660 r.p.m. everything appeared satisfactory but as soon as the belt was put on, after about ten minutes, the no-volt coil in the starter overheated considerably. This was surprising as the motor and starter were brand new, and the line shaft was correctly aligned. However, as a temporary measure I tried a larger starter and the same thing occurred. I was lucky enough to be able to borrow a tachometer, and it was then that I discovered that directly after switch on, on load the speed was 1,660 r.p.m., after five minutes the speed increased to 1,700, at ten minutes it went up to 1,800, and the n.v. coil started burning.

I then realised that since the o.l. trip did not operate the trouble was on the series part of the winding. I stripped the motor down and reversed the series field connections and after re-assembly the same tests were applied and everything was satisfactory. The manufacturers were duly notified and were unable to explain how this fault was not discovered on their own test bench.—*A.R.*

Switch Trouble

I RECENTLY received a call to a cottage in the country to attend to a small electric cooker, having a grill-boiling plate and oven, each controlled by a 3-heat switch and supplied from a 15 amp switched socket outlet. I was informed that the grill-boiling plate was heating although the control switch was in the "off" position.

I proceeded to disconnect the switch, checked it, and found that the element was connected in the "low" position, although the switch was at "off." I then took the switch apart and observed that the contacts were welded together in the "low" position and that carbon was present, due to arcing of the switch during operation.

The switch was designed for a.c. and was clearly marked a.c. only. My experience immediately told me that a.c. was not at all likely to render the switch as such. I then asked the customer from whence came the Electricity Supply and was informed that during the daytime it came from a nearby mill and was then d.c. but at night it was a.c. being from the grid system. This immediately supplied the desired answer.

As it was not possible to replace this switch right away, the grill-boiler plate was connected in the "high" position and was controlled by the socket-outlet switch in order to give service until the new type of switch was available. As soon as possible the switch for the grill-boiler was changed for a d.c./a.c. type as was the oven switch (also a.c. only).—*J. H. R.*

Cable End Protection

IN Mr Satchwill's notes (18 Aug. issue) reference is quite rightly made to the widespread practice of leaving exposed cables at meter and switch positions where conduit fixing facilities are not provided. In many instances it is argued that with all insulated switchgear, etc., giving an approximate earth free enclosure, mechanical protection of cables is not absolutely necessary, but apart from the unfinished appearance of the installation, damage and injury are more likely to occur with exposed cables.

In such cases I have evolved a simple method of protection which can be adapted to suit any particular case where a conduit, t.r.s., l.c., or m.i.c.c. cable system is used to connect to a watt-hour meter, time switch, thermostat, switch-fuse or similar apparatus without mechanical linkage. An additional advantage by this method is the flexibility of installation, avoiding the expense of matching up conduit boxes, fittings and the like. In cases where the cable route is rising or descending vertically to the connection terminal housing, a triangular channel cover is made up from thin mild steel sheet, the depth, length, top and bottom widths being made to suit the space between the cable or conduit end and the base of the meter or switch. The terminal end of the channel is left open and the cable entry end has a turned back flange with a suitable slot to accommodate the size of conduit or cable gland to be used. The side walls of the channel are turned outwards to provide two fixing flanges. A backplate is also provided to give additional protection from moisture on walls and other possibilities.

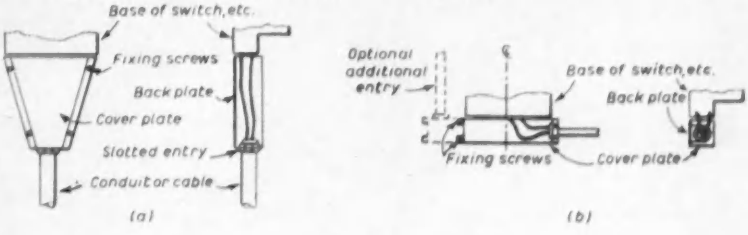
Assuming that the apparatus has been permanently fixed, and that the conduit or cable gland has been brought to its final position, two locking nuts and a female bush are screwed on to the end of the conduit or gland, the topmost nut and bush being locked together, with the bottom nut being left free to turn. The cables are then connected up, the channel backplate is slipped into position and the channel itself is placed over the cables with the gland located in the slot. The backplate and channel are then lightly screwed back on to the fixing base, the bottom locking nut is screwed up to secure the slotted base, the fixing screws are fully tightened, to provide a tidily finished installation.

In case *b*, where the cable route is horizontal or is vertical to a horizontal entry, a rectangular channel is similarly made up, as in case *a*, and in addition the channel can be extended to left or right to accommodate descending cables where base terminal blocks are the rule as with watt-hour meters.—*J. T. R.*

Earth-Neutral Shorts

THE contribution on this subject (25 Aug. issue) was of particular interest to me as I happened to read it immediately after I had come from trying to impress upon a garage man who "does his own" wiring the need for insulating neutral conductors just as carefully as line, pointing out the danger from the neutral line between the pole from which it is fed and the supply transformer breaking. I note the use of double pole fusing in your diagram (as distinct from s.p.n.) and it is surprising that the neutral fuse did not blow. Single pole fusing throughout is, of course, present day practice but one often wonders if, on single phase installations, it would not be wiser to use a d.p. switch fuse immediately adjacent to the meter to afford some protection against the possibility (which has happened on more than one occasion) of the line and neutral conductors being crossed over by a careless linesman.—*"Ubique."*

Methods of terminating conduit cased, and other cables, showing the methods employed for vertical entry (left) and for horizontal entry (right), the latter giving an additional entry or outlet point



Equipment for Industry

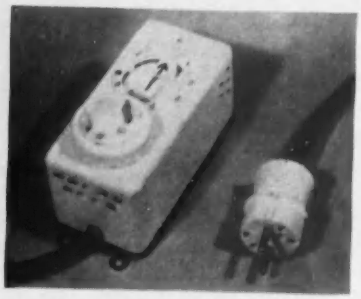
Gas Insulated X-ray Unit

A NEW industrial X-ray unit employing gas insulation for both the tube and transformer has been claimed by NEWTON VICTOR LTD., 132 Long Acre, W.C.2, as the first of its kind to be designed and manufactured in this country. The equipment, "Raymax 150," has been designed primarily for use on open constructional sites where the examination of welded joints up to 1½ in. thick may be necessary.

The high voltage transformer and the X-ray tube filament heating transformer are both contained in a cylindrical steel tank 18 in. diameter. A small diameter pipe with the X-ray target at its extremity, extends 18 in. from the main tank housing the transformers and also the X-ray tube which is directly connected to the high voltage transformer. This extended target tube can be inserted into hollow castings, or the complete transformer tube head can be placed inside pipes or pressure vessels larger than 18 in. diameter. For laboratory use, a gantry supports the tube head so that it can be quickly and conveniently positioned in relation to the specimen. A compact air-cooled water circulator provides a constant flow of water for cooling the X-ray tube target which is at earth potential. This cooling system makes the equipment independent of the qualities and pressure of mains water supplies. Using sulphur hexafluoride to insulate the high voltage transformer and X-ray tube keeps the weight to a minimum and enables improved reliability to be claimed due to the absence of problems associated with insulating oils at high temperatures.

Thermostat Energy Regulator

OPERATING on the familiar energy regulator principle the "Electrotap" manufactured by STABILAG CO., LTD., Mark Rd, Hemel Hempstead, Herts, is said to provide power consumption regulation of any heating apparatus. Housed in a white plastic case, the regulator consists of a pilot switching unit containing



The "Electrotap" energy regulator thermostat fitted with 2 pin plug

a heated bimetal strip which actuates a tripping device. Providing a power consumption regulation range in six steps up to a maximum of 60% of the full load, the regulator may replace automatic temperature controls in situations not requiring a high degree of accuracy. The time delay between switching operations when regulating the supply input for any particular value of full load, enables the "Electrotap" to serve a further use as a flasher unit for electrical signs.

Two versions of this energy regulator are available, the 1405 SKac fitted with a two-pin plug and socket and the 1405 SAck which has terminal connections. Both models incorporate a neon indicator lamp. The unit's overall dimensions are approximately 5¼ in. x 2½ in x 2½ in.

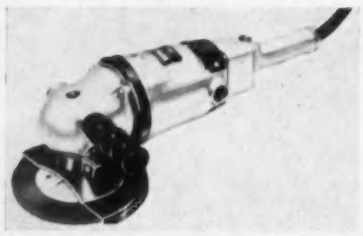
Distribution Switchgear

BEING shown this year at the Engineering Marine and Welding Exhibition are the well-known Type MB oil circuit-breakers manufactured by ERSKINE HEAP AND CO., LTD., Broughton, Manchester 7. These switchboard type breakers come in two ratings. The "MB" for voltages of 400/660 with current ratings of 600, 800, 1,000 and 1,200 amps and a tested rupturing capacity of 25 MVA at 400 V, and the 3 MB for 3·3 kV with current ratings of 400, 600 and 800 amps and a tested rupturing capacity of 50 MVA at 3·3 kV (with overrating tests of 75 MVA). Both these use the patented contact layout.

The circuit-breaker can be fitted with hand, spring-closing or solenoid operating mechanism. Overcurrent, undervoltage, shunt trip and direct earth leakage coils can be fitted as required, the total number of trips being five. Overcurrent releases are current transformer operated and adjustable oil dashpot time lags, or time limit fuses can be fitted to all overcurrent releases, and suitable auxiliary switches can be provided to suit all normal requirements. Erskine Heap also manufacture switchgear up to 11 kV, 250 MVA, with "direct blast" arc control, and in the motor field have a great variety of starters and auxiliary equipment.

Industrial Sander/Grinder

DESIGNED primarily for industrial use is a new 7 in. heavy duty optional-speed sander grinder, introduced on Monday by BLACK AND DECKER LTD., Harmondsworth, Middlesex. Replacing their 7 in. heavy duty sander, the new machine is claimed to deliver 90% more power than its predecessor although lighter in weight. It is available in three models with spindle speeds of 4,200, 5,200 and 6,000 r.p.m., each unit being



Black and Decker's latest—their 7 in. heavy duty sander and grinder

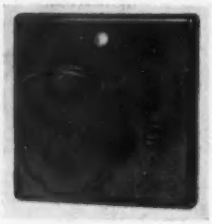
designed for a specific range of work. Main features applicable to all three models include construction designed for continuous production service with grease-sealed ball bearings, stated to require no periodic lubrication. A replaceable steel "wear ring" protects the front of the main housing from wear and breakage whilst a removable steel inspection plate permits easy brush and commutator inspection. The switch itself is enclosed to afford protection from abrasive dust, and guards prevent it from being accidentally knocked on. These tools are suitable for use with Nylon bonded depressed centre abrasive discs of both 7 in. and 9 in. dia.

Black and Decker also announce that as from 1 Sept., 1955, their sander-polisher drill pack will be reduced in price from £9. 10s. to £8. 10s. The contents of the pack remain the same as before and consist of the basic unit, a ¼ in. chuck, a rubber pad, a lambswool bonnet and three sanding discs.

Newton Victor offer their "Raymax 150" industrial X-ray unit on constructional sites where joints up to 1½ in. thick may have to be examined

G.E.C. 13 amp Flush Switch Socket

NEW accessory now available from the GENERAL ELECTRIC CO., LTD., Magnet House, Kingsway, W.C.2, is a 13 amp 3-pin flush switch socket and plug. The socket is mounted beside a Mutac switch on a 3½ in. square Bakelite plate with fixing holes at 2¾ in. centres for use directly with B.S.1299 or 1363 type bases. Each switch socket is supplied complete with a plug, fitted with a 13 amp fuse as standard but 3 and 7 amp fuses can be fitted against specific requirements. The shutters cover the line and neutral socket tubes and are opened by the insertion of the earth pin. Catalogue number is S.4954/2959, and the price in brown is 10s. 4d. and in cream 11s. 4d.



G.E.C.'s new 13A flush switch socket and plug

C90 Cooker Reduced in Price

EFFECTIVE from 1 Sept., is a reduction to £48 in the price of the C.90 cooker. In addition, BRITISH NATIONAL ELECTRICS, LTD., Charlton, S.E.7, announced that the C52 and C53 models in mottled grey will retail at the same price as the models in two-tone ivory finish, i.e., £28 and £31. 6s. respectively. Both models will be available in quantity.

Eterna Fluorescent Lighting

LIGHTING equipment of high quality in construction and materials is evident in the Eterna range of fluorescent lighting produced by ENSEL ELECTRICAL CO., LTD., 218-219 Upper St, London, N.1.

New Broadsheet No. A/5,000/7/55 gives details of the range of fittings which includes industrial trough fittings, "seagull" fittings and batten fittings for one, two, three and four tubes of the standard 20, 30, 40 and 80 W ratings and sizes.

Two fittings of particular importance in shop fittings are the window fittings provided by the combination of the 80 W 5 ft and 40 W 4 ft batten fittings and the Catalogue HR5 or HR4 half-round reflectors. The Eterna range also includes louvred fittings with glass panels.

Control gear and accessories are another facet of Ensel production and is featured by the company in their current advertisements in this issue.

An Entirely New Convector

DUE out in October is an entirely new type of panel convector heater. Called the "Caprice" and given a catalogue number of U95715 by FALK STADELMANN AND CO., LTD., 91 Farringdon Rd, E.C.1, the new convector is of contemporary design and employs six low temperature elements in individual ducts to provide high velocity circulation of warm air. The Caprice is fitted with indicator lamps and switches for either 1 or 2 kW loading. It measures 20¾ in. high, 22⅛ in. wide and 3¾ in. deep with foot span of 7¼ in. The exterior casing has panels stove enamelled in hammered gold or hammered pewter and is also available in contemporary colours. Centre band and feet are chromium plated, the feet concealing rubber wheels for easy movement and the centre band providing a mounting for easy grip handles. Price is £9. 10s., p. tax £3. 9s. 8d.

A Warm Dry Towel the Easy Way

THERE are few things more pleasant after a bath than a brisk rub down with a really dry towel. You can have dry towels all the year round with an electric, oil-filled towel rail made by

This young lady appreciates a warm dry towel

HURSEAL LTD., 229 Regent St, W.1. Beautifully finished in heavy chromium plate which makes them ideal for drying delicate fabrics and silk stockings, these towel rails are always safe to touch and never scorch. They are indispensable in a home with children, especially if there is a baby, and cost only a few pence a week to run. They are easily installed in any bathroom. Prices range between £27. 2s. 10d. and £29. 17s. 5d. according to size and fixing.

Ice Cream Conservers

TWO new ice cream conservers, the LTS.725 and the LTS.345 are announced by the COLDRATOR DIVISION of The Hotpoint Electric Appliance Co., Ltd., Fletton, Peterborough.

For the Electrical Trade

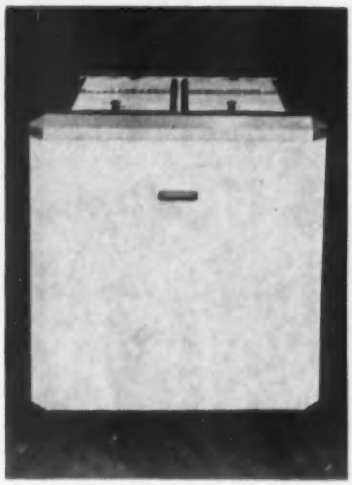
•

Interesting feature of these two models is the flow of air which is kept circulating between the exterior of the insulation and the outer shell, preventing excessive condensation on the walls of the cabinet.

The shells of cabinets are of heavy gauge sheet steel and are finished in white stoved enamel. The interior is of heavy gauge Birmabright and the cabinets are mounted on castors to ensure easy and silent movement. The lids are of the double "Flip-flap" type.

A 3 in. thickness of fibre-glass entirely surrounds the storage well which has a thermostatically controlled temperature. This can be varied between 0° F and 15° F in ambients up to 90° F. The refrigerating system uses a motor-compressor unit sealed in a steel shell and spring mounted to eliminate noise and vibration.

Storage capacity of the LTS.725 is 7·25 cu ft and of the LTS 345 3·45 cu ft. There is a five-year guarantee on the sealed refrigerator unit and a one-year guarantee on the complete refrigerator, and the prices LTS.725, £112. 10s.; LTS.345 £83.



The new Coldrator "Conserver"

TRADE PUBLICATIONS

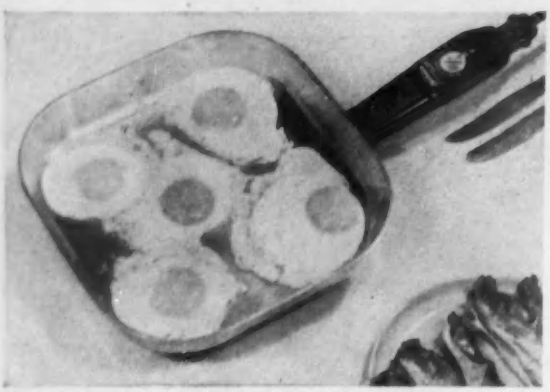
SCAFFOLDING.—New type Kwickform Unit frame scaffolding is described in a leaflet available from Kwickform Ltd., 66 Victoria St, S.W.1.

CONSTRUCTIONAL EQUIPMENT.—Lists received from George Pike Ltd., Alma St, Birmingham 6, describe (i) the Hog one-man tool for tree cutting and undergrowth clearance; (ii) Atlas lifting trucks; (iii) Duff-Norton Jacks; (iv) Dunlop Industrial footwear.

CABLE ACCESSORIES.—List No. 6976 issued by Metway Electrical Industries, Kemp Town, Brighton 7, describes the range of glands, line taps, connectors and cable sockets.

The Electric Frypan arrives from the U.S.A.

THE automatic frypan which is fast outselling all other Sunbeam appliances in the United States, where surveys show that 80% of all cooking is done on the hob of a cooker, is now available to the trade in Britain, token distribution commencing immediately with supplies generally available in a couple of weeks.



Five eggs fried at the same time is a measure of the Frypan's capacity

SUNBEAM ELECTRIC LTD., 14-16 Old Quebec St, W.1, British counterparts of American concern are handling this third Sunbeam appliance to be available in the U.K. (others expected soon, are the Sunbeam Steam Iron and the Deep Fryer).

The Frypan is a 10½ in. sq deep aluminium pan with the 1,250 W element cast integral with the base. Heat is controlled by a thermostat and switch set in the handle of the pan. A list of proper temperatures for 13 popular everyday dishes is also incorporated on the handle so that the automatic control can be adjusted accurately and thus avoid the greasiness evident in frying at the incorrect temperature.

Heat insulating feet are fitted to the underside of the frypan so that the makers are confident in recommending its additional usage as a hot plate and a domed heat proof glass or metal cover lid is available so that the Frypan can double as a table cooker. This it does very successfully and provides the ideal method in a small flat of grilling, stewing, poaching and even pot roasting and baking. The frypan is waterproof as far as the control dial and can be safely immersed in hot water that far.

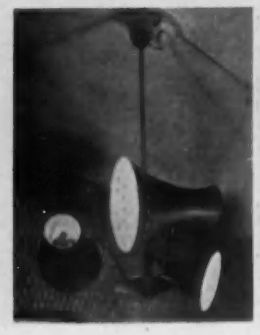
Price of the Frypan is £7. 17s. 6d. and it is available for a.c. mains supplies 100-120 V; 200-220 V; and 230-250 V. Price of the glass lid is £1. 1s. and the aluminium lid £1. 2s. 6d.

Home Lighting in World Style

NEW season's range of lighting for the modern home introduced by HOMESHADE CO., LTD., 99 Baker St, W.1, and seen on their new lighting salon (see ELECTRICAL TIMES, 1 Sept. issue) includes many attractive and striking designs. Homeshade's range will appeal to all houseproud customers whether they prefer the "traditional" or "the contemporary" style in interior decor.

First of the six pendant fittings illustrated below is the "Costa Brava" which has cast brass arms, adorned with ceramic flowers, and mounted on a pottery column and base. Each fitting is multi-coloured but there is a choice of six predominant colours. Price is £23 inc. tax. Second in the top row is a fitting (E9463), the work of one of the leading Scandinavian designers. Brass work is excellent. Price £43. 10s. 3d. (inc. tax). The five-light Florentine hand-carved fitting called "Sorento" has been designed by the managing director Mr J. Soneya. Available in Florentine gilt or ivory, this fitting costs £7. 16s. 4d. inc. tax but excluding shades. Left to right on the bottom row are a three-light all-metal fitting in black, red or yellow with adjustable shades and a product of West German designers costing £13. 18s. 6d. (inc. tax); next an attractive "Toledo" fitting in cast brass and black by Marti Fonell of Barcelona, and costing £27. 10s. (inc. tax but excluding shades) and a contemporary five-light pendant with shades in five different colours in the one fitting. Each shade has a solid brass decorative ring and is pin-pierced. It is available in matt or bright enamel finish, has a ceiling cup in polished or lacquered brass and costs £10. 8s. 10d. (E.T.S.).

The three-light floor standard designed by Rupert Nikoll of Vienna and called Femille, has four uprights of lacquered brass whilst shades are balanced over the lights. Cost £21. 15s. 2d. (inc. tax).



NEWS OF THE WEEK

UNIPEDE Congress comes to London

Lord Citrine presides at first to be held in U.K. Capital

THE first Congress of L'Union Internationale des Producteurs et Distributeurs d'Energie Electrique—U.N.I.P.E.D.E.—to be held in London, opens on Monday week, under the presidency of C.E.A. chairman, Lord Citrine. The Congress meets every third year in one of the European capitals and is in fact the tenth to be held. Over 1,000 delegates are expected to attend. Proceedings begin at the Central Hall, Westminster, on the Monday morning, when, after a welcome by the president, the first session will be opened by the Minister of Fuel and Power and addressed by Sir Christopher Hinton, managing director of the U.K. Atomic Energy Authority's industrial group. The Lord Mayor is to attend a reception at the Guildhall on Monday evening. Working sessions extending over four days will take place at Church Hse, Westminster. There are a large number of papers for presentation and discussion on subjects covering thermal and hydro-electric generation, atmospheric pollution, distribution, tariff statistics and protection of telecommunications. Three study courses in England and two in Scotland have been arranged to hydro-electric and steam power stations, substations and distribution installations, as well as to places of historical interest. Other visits have also been planned to places of electrical and general interest, including the C.E.A.'s research laboratories at Leatherhead. Full details of papers to be read were issued last weekend.

CONFERENCE ON ELECTRIC TRAVELLING CRANES

ELECTRICALLY operated travelling cranes is the subject of a conference being organised by the plant engineering division of the British Iron and Steel Research Association. It will take place at the Hotel Majestic, Harrogate on 5 and 6 Oct. A large proportion of the conference will be specifically related to the electric crane, but papers will also deal with various other aspects of the subject, such as studies of cab and control design, and the techniques of stress measurement. Chairman at the conference will be Mr W. F. Cartwright, assistant managing director and general manager (steel division) of the Steel Co. of Wales Ltd. As a result of recent research by B.I.S.R.A., the specification for heavy duty electrically operated travelling cranes for use in iron and steel works has been revised. Copies of the revision will be available this month, it is stated. Full particulars of the conference may be obtained from the technical secretary of the Association's Plant Engineering Division at 140 Battersea Pk Rd, London, S.W.11.

TARIFF INCREASES IN N. EASTERN AREA

LATEST Board to increase their charges following the rise in coal prices are the N.E. Electricity Board, who announced details last week. The domestic two-part tariff has been discarded and consumers will be transferred to the domestic block tariff. The primary rate for this tariff and the farm tariff has been raised from 4d. to 4½d., and the final rate of ¼d. has been increased to 1d. Rebate on prepayment meter tariff has been reduced from 17½% to 12½% and on the load-rate prepayment meter from 12½% to 7½%. The commercial rate has been increased by ½d. a unit. Announcing the alterations, the chairman, Mr T. M. Ayres, stated that the rise in coal prices would mean £1,400,000 a year extra on the costs incurred by the Board.

New Turbine Factory in Northern Ireland

FOUNDATION stone of the office block of the British Thomson-Houston Co. Ltd.'s new turbine works at Larne, Co. Antrim, is to be laid by Viscount Brookeborough on 29 Sept. The new 400,000 sq ft factory to be built in N. Ireland is to cost about £8m, and is the result of continued heavy demand, which far exceeded the capacity of the smaller works, also situated at Larne. About 3,000 will probably be employed at the factory, scheduled to start operations in 1957 making steam turbo-alternators of 30 MW and upwards.

Rhodesian Copper Price goes up Again

FOR the second time since the introduction of a fixed selling price for copper to those U.K. consumers "willing to instil a degree of stability into the resale prices for copper and brass products," the Rhodesian Selection Trust's fixed price has been raised. The stabilisation scheme was introduced on 9 May when the price was fixed at £280 a ton against the London Metal Exchange quotation of £304. At the beginning of last month the R.S.T. price went up to £325 per ton against the Exchange price of £360. It is now announced that the new Trust price is £360, operative from last Monday. The increase of £35 a ton is about the same margin as exists between the new R.S.T. price and the L.M.E. price last weekend.

The new price is now subject to variation at 24 hours' notice instead of the previous minimum period of 30 days. Within the past month, the London copper price has been up to the £400 mark, whilst the price quoted by American producers had increased from 36c to 43c per lb (£344 a ton).

U.K.-German-U.S. Link in Furnace Development

IT has been announced that an arrangement has been concluded by Birlec Ltd., with Otto Junker GmbH of Lammersdorf Germany, and the Ajax Engineering Corporation of New Jersey, for the development and marketing of the mains frequency coreless induction melting furnace. This type of furnace, applicable to both ferrous and non-ferrous melting, has been pioneered over a number of years by Junkers, who have made over 80 installations totalling some 30,000 kW. Birlec began development work in the same field in this country more recently, and have a prototype unit in industrial use.

New District Offices planned in Belfast

IN a report to the electricity committee on staff reorganisation, Mr R. P. Watson, general manager of Belfast Corporation's electricity undertaking, suggests the acquisition of one or two premises for use as district offices. He states that if this proved beneficial to consumers and the supply undertaking, the policy of providing district offices could be extended. At present there were no showrooms or demonstration theatres, and the only office available for the receipt of applications and inquiries was in the hallway of the undertaking's headquarters in East Bridge St. This office was also most awkwardly situated for the majority of consumers. Mr Watson points out that such conditions not only retard sales development but also tend to annoy customers. He goes on to state that it was most desirable to obtain a site convenient to the city centre to cope with inquiries and other matters, and urged that the building should be proceeded with as quickly as possible.

Neighbourly TV Chat to advertise Space Heaters

ONE of the first firms to give full details of their proposed advertisements on commercial television is Berry's Electric Ltd. A series of six one-minute films featuring the merits of their Raydair background heater have been produced explaining the advantages of electric "central heating" in the living rooms the nursery, bedrooms and hall. The series begins on Sunday, 16 Oct., in the popular 7.30 to 8 p.m. viewing time and just before the Palladium feature.

In these early days of commercial TV advertising the experiences of Berry's Electric, and their approach to the formidable task may well prove beneficial. The company's films are directed to make viewers, particularly the housewives, feel they are talking to the people next door about heating problems, and consequently Raydair is recommended by a satisfied user rather than demonstrated by a professional salesman. Whilst trying to avoid "plug" selling at all costs, Berry's have endeavoured not to stress their sales message so lightly that the film becomes merely an irrelevant interlude between two programmes.

Although a minute appears very short, there are few advertisements which can command a full minute's attention, but Berry's affirm that the fireside chat quality of television is ideally suited to the sale of heating appliances. They discovered there was no time for veiled approach and that a happy medium had to be found between insufficient emphasis and "a froth of superlatives and sales jargon." Each of the six films ends with the phrase "take a closer look at the Raydair in your electricity shop." Berry's rightly point out that however great their efforts only the electrical dealer can "make the kill."

A "still" from one of six one-minute films produced by Berry's Electric for television advertising, featuring the Raydair heater for use in the nursery. The first in the series will be shown on 16 Oct

London Board's Own Agricultural Show

ONCE again this year the London Electricity Board takes its one opportunity to participate in one of the nearest approaches to an agricultural show held within the boundaries of Greater London. The annual Civic Show at Willesden takes place this weekend and the London Board, as last year, is organising a large marquee for the display of electrical appliances. The exhibition proved outstandingly successful last year and a repetition was imperative. Ten manufacturers are co-operating to provide a comprehensive display. They are Burco, B.N.E., Electrolux, English Electric G.E.C., Hoover, Hotpoint, Jackson, Aidas Electric and Simplex. The Board themselves will have a small display and information bureau. Incidentally we hear that the I.T.A. will be getting in a little practice preparatory to the start of commercial TV on 22 Sept. and taking some shots at the Show. The Show will be at Roundwood Park on 10 and 11 Sept.

MERSEY GOLF FINALISTS

A MOST successful meeting took place at Heswall last week which produced some good golf and £425 for E.I.B.A. funds in the W. Lancs, Merseyside and N. Wales area competition for the National Golf Championship. Major competition was won by G. Baker with F. Warren as runner-up. Best scratch score was returned by H. Harding after a tie with H. Dodd and F. Warren. Winners of the Greensome competition were F. Warren and R. Rawle, with R. Gravette and G. Elston in second place.

ATOMIC PLANT ORDERS

A LIST of orders secured by C. A. Parsons and Co., Ltd., for nuclear power plant is already a formidable one. The first contract for Calder Hall power station involved four turbo-generators with condensers and auxiliaries, eight large gas circulators, two dump condensers and cooling gas duct-work. Recently a repeat order was placed for the second section of Calder Hall. Further orders for the Chapel Cross nuclear station comprise eight turbo-alternators, each exceeding 20 MW.

OFFICIAL PUBLICATIONS

COPPER. Report of Monopolies and Restrictive Practices Commission on certain semi-manufactures of copper and copper based alloys. (see page 356). H.M.S.O. 7s. 6d.

BRITISH STANDARDS

Code of Practice, C.P. 1006, 1955: Radio Interference Suppression (see page 352).

Amendment Slips: PD 2217: Oil circuit-breakers for a.c. circuits up to and including 660 V, amending B.S.936, 1940; PD 2241: Letter symbols, signs and abbreviations, part 1, general, amending B.S. 1991, 1954; and PD 2227: Protective transformers, amending B.S. 2046, 1953.

Hoover Now have Second Mobile Exhibition

THE mobile exhibition which has toured the country in the summer months displaying Hoover Ltd.'s products has now been joined by a second travelling showroom, which the company is putting into service immediately. The older exhibition has been a familiar sight at agricultural shows for a number of years, and the second will join it on the extensive summer tours now becoming too great a burden for a single vehicle. Unlike the first, this latest display is to tour the country in winter as well, showing Hoover products in isolated rural communities, on new housing estates and in other districts where there is no handy display for the population.

The exhibition is transported by a Fordson prime-mover truck drawing a trailer 7½ ft by 22 ft. This trailer, made by Sparshatts Ltd., can be expanded by the Deplirex method to a floor area of 14 ft by 22 ft and houses the exhibition proper. Up to three sides of the trailer may be opened for an unimpeded view of products, while goods are also shown on exterior platforms. Half the expanded walls fold up to form a canopy, while steps are arranged at two of the corners of the trailer. In wet or cold weather, the whole display can be housed inside and there are facilities for film shows. Among the other conveniences provided is a water storage tank, water heaters and drainage system, adequate heating, and writing desks. It is manned by a crew of four for driving, assembly and maintenance, and will be staffed by Hoover's district sales representatives.

Electrical Appliances should be run off 3-Pin Plugs

ADDRESSING members of Wallsend Home Safety Committee, Mr L. Gallagher, of the N.E. Electricity Board, urged consumers not to run electric washing machines, and electrical appliances in general, off two-pin plugs. Demonstrators often found no plugs in kitchens and for convenience connected the washer to the electric light holder. Few people bothered to have a proper three-pin plug fitted. Mr Gallagher went on to say that with the rapid development in the use of electrical apparatus since the war, there had been a deterioration in the quality, thickness and weight of insulation materials, so as to reduce costs.

E.A.W. ACTIVITIES

June Exam Results

RESULTS of the Housecraft Examinations by the E.A.W. last June were announced over the weekend. In the 37th Certificate Exam for demcnstrators and saleswomen, held on 16 June, 95 candidates qualified, seven of them gaining distinction. The total number of certificate holders is now 2,312. Two days later the complementary exam for teachers took place and 48 candidates qualified for the certificate. A total of 2,005 now hold the certificate.

New Branch in Yorkshire

INAUGURAL meeting of the Pontefract and Castleford branch of E.A.W. took place recently at Pontefract's civic library. Mr O'Neil, director of Modern Electrical Industries, took the chair. Principal speaker was Dr Frazer of the local General Infirmary who spoke on "Electricity as an aid to Modern Science." An interesting programme has been arranged for the autumn.

21st Birthday

LAST Thursday, the Stafford branch of E.A.W. celebrated their 21st birthday and the occasion was marked by two presentations. Home Workers' Certificates were awarded by Mr J. Gordon Kellie of the Midlands Board, and the branch President, Mrs W. H. Westhead, presented two electric blankets for the use of the blind people in the city.

1955 Conference on Personnel Management

THIS year's National Conference of the Institute of Personnel Management will be held at the Royal Hall, Harrogate, from 7 to 9 Oct. For the fifth time, one-day courses will be held before the conference. Subjects of this year's courses are Selection Methods, Employee Record Systems, Merit Grading, and Labour Turnover. There will be a Presidential Address followed by the formal annual meeting, and a reception by the Mayor and Mayoress of Harrogate takes place on Saturday evening.

A small corner of Thorn's new Birmingham showrooms in Sheepcote St

New Showrooms opened in Birmingham

MIDLAND area showrooms have been opened at 24 Sheepcote St, Birmingham, by Thorn Electrical Industries Ltd.'s Atlas lighting division. They provide excellent facilities for showing the company's products in pleasant contemporary surroundings and include a miniature stage suitable for demonstrations of controlled theatre lighting. The automatic dimmer-unit may be used to control either the lighting of the stage or a three-colour group of fluorescent tubes in a cornice in the showroom ceiling. Another feature of the showrooms is a colour-comparator, each section of which is large enough to be dressed as a shop window, and which can be used to demonstrate the effects of different light sources and colours on food, fabrics and other goods. There is, of course, a representative range of fluorescent and incandescent fittings on show, including industrial units and louvred ceilings, while a further display is devoted to control gear and accessories.

An area of some 7,500 sq ft in the same building is devoted to warehouse accommodation for Atlas products, and a section is also reserved for products of other Thorn Divisions, notably Ferguson radiograms and TV sets. This new depot should result in improved facilities to the trade and Thorn do, of course, extend a cordial invitation to all customers to visit them.

Travellers' Ball

ANNUAL ball of the Electrical Trades' Commercial Travellers' Association is to be held at the Park Lane Hotel, Piccadilly, London, on 7 Oct. Applications for tickets should be made by 26 Sept. They will cost 37s. 6d. each and are available from the hon. social secretary, Mr A. J. Murray, o/c British Electric Lamps Ltd., 299 Westminster Bridge Rd, London, S.E.1.

The First Half-Century

German Prices Advance

As at home, so in Germany the cost of raw materials, especially copper, has risen. That and an upward tendency in wages have induced the German electrical manufacturers to clap 10% on their prices for generators, motors, transformers, switchgear, etc. —*From our issue of 7 Sept., 1905.*

"I JUST WIGGLED IT"

10-Year-Old Boy Explains

THERE have been many cases of rifling electricity slot meters but at Leicester Juvenile Court last week a 10-year-old boy was said to have taken £3. 9s. from a meter in a way which had completely baffled the police and technical experts. Mr H. M. Purnell, chairman, said electricity authorities should be warned that perhaps the boy had tumbled across a foolproof method of rifling meters. The only explanation given by the boy as to the way he did it was a wave of the hands and the statement "I just wiggled it." He added that an 8-year-old schoolboy had shown him how to do it, and as a result he was remanded for three weeks to enable the fullest enquiries to be made into the circumstances.

19-year-old Miss Christine Cops, who works in the development and engineering drawing office of E. K. Cole Ltd., represented this country in last weekend's athletic match with France at Bordeaux. She is a long jumper and was placed second to her team-mate, Miss S. Hoskin. Our photograph shows Mr A. J. Brunker, chief engineer, congratulating her

Lights Up for 1955 Season at Blackpool . . .

EQUIPMENT valued at £375,000 has been incorporated in the six miles of light at a cost of £80,000 which forms the 1955 Blackpool Illuminations. Some 350,000 multi-coloured lamps will form a background to hundreds of features and animated tableaux among which Pantomime Land is probably the most ambitious. The illuminations, claimed (not without rivalry) to be the "greatest free show on earth," are to be switched on tomorrow (9 Sept) by the Russian Ambassador, Mr Jacob Malik. They will run until 24 Oct.

. . . and Morecambe

MOST enterprising yet, is the verdict on this year's display of illuminations at Morecambe, where the highlight is the Enchanted Gardens in Happy Mount Park. New sights in the park include three-dimensional animated tableaux of such characters as the old woman who lived in a shoe, Snow White, Hans Andersen's chimney sweep and shepherdess. To see all the lights means a three-mile stroll along the promenade with many detours. First electrical display in this resort was in 1919, but illuminations on a large scale, as we know them today, began in 1937.

Exports to Turkey

U.K. EXPORTERS or merchants are invited by the Board of Trade to supply details concerning shipments of goods imported into Turkey for which sterling payment has been outstanding since dates between 31 Dec., 1953, and 18 Jan., 1955. It will be recalled that earlier this year the B.o.T. explained they were collecting by stages details of sterling payments due in respect of goods imported into Turkey and which were outstanding on 17 Jan. last, when the Agreement between the U.K. and Turkey was signed. This information has been collected and the latest information should be supplied by 24 Sept.

Water Cooler Agreement

IT has been announced that Heenan and Froude Ltd., of Worcester, have reached an agreement with the Marley Co., of Kansas, for the joint production of water-coolers. The British company, as exclusive licensees, will make the coolers for nearly all parts of the world except the two Americas. The plant will be designed by the American firm, with slight modifications to meet British requirements, and will be known as the Heenan-Marley cooler. For their part, the U.S. company, which claims to produce more evaporative water coolers than any other firm in the States, will hold a "cross" licence to make Heenan coolers. Commenting on the agreement, a Heenan and Froude spokesman, said it was hoped that increased production and more employment would result, but it was too early yet to say definitely.

This lightweight caravan provides an excellent shop window for Kenwood Manufacturing Co., Ltd., and has done sterling work already displaying and demonstrating the company's range of food mixers at numerous agricultural shows. It is drawn by a 2-ton Ford diesel truck, and includes a sleeping compartment for the driver. At one end of the trailer is a kitchen fitted with a sink, a refrigerator and also a calor gas water heater. At the other end is an office. Electric points have been fitted throughout. The caravan is 20 ft long and 7½ ft wide

EDUCATION

Mid-Essex College issues 1955-56 Prospectus

FULL Prospectus of the engineering department of the Mid-Essex Technical College and School of Art has been issued. A good selection of part-time day and evening courses are offered leading to Ordinary and Higher National Certificates in Electrical Engineering, City and Guilds and other examinations. The autumn term begins on 19 Sept., and enrolments take place between 12 and 14 Sept. Prospectus and further details may be obtained from the Head of Engineering Dept., at the College, Market St, Chelmsford.

Fuel Courses

CITY and Guilds of London Inst., and other part-time courses in fuel subjects offered at Polytechnics and Technical Colleges in London and the home counties during 1955-56 have been listed. Copies of the list may be obtained from the London and Home Counties Regional Advisory Council for Higher Technological Education at Tavistock Hse South, Tavistock Sq, W.C.1. A list of establishments offering the courses is included, but the courses can only be held if demand warrants it.

STEEL MILL ORDER

THE General Electric Co. has secured a £165,000 contract from the Australian Iron and Steel Co., Ltd., covering the complete electrical equipment for a two-stand temper mill for steel strip at Port Kemble, N.S.W. The mill will be similar to those now in use at the Steel Co. of Wales' Trostre Works which were the first in this country to operate at strip speeds of up to 4,000 ft per min.

Campaign opens to sell Electric Frypan

DETAILS of the campaign to launch the new electric automatic Frypan, to be made and marketed in this country by Sunbeam Electric Ltd., were given at a Press conference last week. National Press advertising, demonstrations, point-of-sales displays and a series of special dinners are all included. Later this month and in October there will be special local activities in some 60 major towns

The first Frypans will be made under contract and it is hoped to have deliveries on the move within a week, but as soon as the new Sunbeam factory is completed, they will be produced there. Special efforts will be made to build up stocks during November to cater for the Christmas trade. Distribution will be through wholesalers and to large stores. It is interesting to note that Sunbeam now have 18 demonstrators operating in different parts of the U.K.

NEWS IN BRIEF

Viscount Chandos, chairman of A.E.I. Ltd., will address a meeting of the London branch of the Chartered Inst. of Secretaries on 14 Dec. The meeting will be at the Institute's conference hall at 20 Aldermanbury, London, E.C.2, at 6.15 p.m.

Sixty-two employees in the Plymouth district of the S.W. Electricity Board have been presented with Long Service Certificates. Of the recipients, seven had over 35 years' service, and the remaining 55 had over 25 years' service.

The new Transfer Function Analyser is among the exhibits of Solartron Electronic Group Ltd. at America's tenth annual Instrument-Automation Confer-

Between this girl's bath
and the wall
There used to be nothing
at all
Till a lively young lad
Thought: I've got it,
begad!
PVC would undoubtedly
make an effective,
economical, attractive and
easy-to-fit sealing-strip.

A motor designer from
Lancs
Gratefully murmured his
thanks
When a Lorival chap
After doffing his cap
Suggested that PVC
would make an effective,
economical and easy-to-fit
petrol tubing.

Some limericks – from the

A fireman, talking aloud
Made this remark to the
crowd
Some boffin, I hear
Has a darned good idea
He says that PVC
would make a remarkably
effective, tough, durable
fire hose lining.

There once was a
Scotsman of Fife
Whose packaging
problems were rife
Until one day he spoke
To a Lorival bloke
Who said that PVC
sheeting would be an
effective, economical,
moisture-and-chemical-
proof answer to his
packaging problems.

lively lads at Lorival . . .

An electrical fellow
near Speke
Discovered a terrible
leak
But along came his
mate
At a helluva rate
Saying that Lorival
PVC would make an
effective, economical
insulating material for
all sorts of electrical
work.

PVC, in the hands of Lorival's lively lads, can do a lot of jobs better and cheaper. Why not drop a line to Lorival? Then you can get together with the lively lads and figure out ways and means of using PVC to your advantage.

LORIVAL PLASTICS

United Ebonite & Lorival Ltd., Little Lever, Nr. Bolton, Lancs.

L63

NOW IS THE TIME TO ORDER

MEM ELECTRIC FIRES AND CONVECTORS

New season's range is better than ever

Check over the new season's range of MEM electric Fires and Convectors, and you will find the answer to every customer's needs.

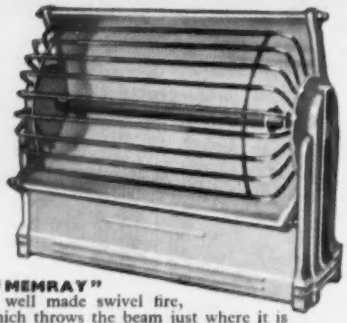
Here are attractive designs and really sound workmanship which will make an immediate appeal to your customers. Every MEM fire complies fully with BS 1670 with its exacting standards of technical performance and quality. All guards conform to BS 1945 to ensure safety in accordance with statutory regulations.

Only MEM methods of production could provide appliances of this quality at such reasonable prices.

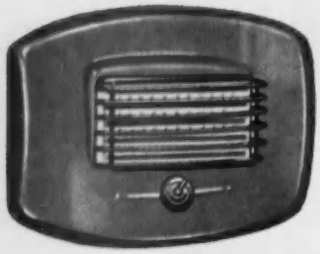
Last season's demand was phenomenal. Our planned output was absorbed by the end of November. Make certain you get the fires you want by ordering now.

Send for fire list No. 361.

"REFLEX" A best seller in the fixed reflector fire class. Cast iron ends of pleasing design, high quality chrome brass reflector. In 1 and 2 kW ratings. Available in a range of attractive colour finishes.



"MEMRAY" A well made swivel fire, which throws the beam just where it is wanted. Chromed brass reflector, efficient guard, robust construction in 1 and 2 kW ratings.



PANEL FIRES Pleasing modern designs for mounting on walls, with or without recess. Ideal for bedrooms or occasional rooms. Available in flat bar or reflector patterns, 1 and 2 kW ratings.

"MEMGLO" A new flat bar type fire of sheet steel construction, light, strong and competitive in price. Attractive simple design. Finish mottled stone only. In 1 and 2 kW ratings.

"CIRCULAIR" CONVECTOR A new portable 1 kW Convector in bronze finish, at an attractive price. Ideal for providing extra heat, wherever a power point is available in the home.

"MEMVAIR" CONVECTORS MEM Convectors established their popularity last season. Handsome, efficient and absolutely safe, they provide top quality heating equipment at reasonable prices. The finish is lovely bronze, long-lasting and easy to clean. Supplied in three ratings—1, 1½ and 2 kW, with or without thermostat.

MEM

MIDLAND ELECTRIC MANUFACTURING CO. LTD.,
Tyseley, Birmingham, 11
Branches at London and Manchester

ence at Los Angeles. Solartron are believed to be the only British exhibitor.

Latest edition of *Hurseal Times*, issued by Hurseal Ltd., contains a comprehensive and detailed review of all products made and marketed by them.

A comprehensive range of Prestcold commercial refrigeration equipment will be displayed, much of it in operation, at the manufacturer's Hammersmith premises in King St on 24 and 25 Sept.

First issue of *Crypton News* has been published by Crypton Equipment Ltd. It is designed to provide distributors of garage equipment with easy-to-understand and practical information about their products. Copies are being circulated.

Eastern Board's administrative staff at Welwyn Garden City have been moved to St. Albans for centralisation and efficiency reasons.

Wilkinson Rubber Linatex Ltd. have just beaten foreign competitors to an order for 144 Linatex rubber-lined centrifugal pumps for the Argentine. Negotiations were conducted with the Instituto Argentine de Promocion del Intercambio and the pumps will be used by that country's mining industry for handling abrasive slurries.

The N.W. Electricity Board have opened new showrooms and offices at Penrith in Cumberland.

Brief subject and author index of papers in the proceedings between 1937 and 1954 has been published in booklet form by the Institution of Mechanical Engineers, 1 Birdcage Walk, Westminster, S.W.1.

Sayings OF THE WEEK

"Generally speaking, in foreign markets as opposed to Empire Markets, British design is rarely acceptable, and until we are prepared to do more to comply with the tastes of our friends, we must expect our warehouses to remain full." . . . J. M. BRYAN, writing to the *Daily Telegraph*.

"There have been some theories that reading the evening paper requires a room full of light. Many people, however, like to read under a standard lamp, with, perhaps, a scanty general illumination. There is nothing in the results of the experiments to show that this preference is wrong." . . . W. R. STEVENS and C. A. P. FOXWELL, at the British Association meeting.

"If it is good for the trade union movement to accept guidance from the T.U.C. on the one hand, then surely the F.B.I. ought to be concerned in persuading individual employers to negotiate reasonable wage rates and proper working conditions before deciding to call a lock-out!" . . . in the journal of the Amalgamated Society of Woodworkers.

ELECTRIC SUPPLY NEWS

Belfast

To obviate any possibility of complaints concerning atmospheric pollution, the Electricity Dept. has proposed that the chimneys at Municipal power station West be reduced to two and their height increased from 120 ft to 240 ft, at an estimated cost of £26,000.

Eire

The first of three 30 MW generating sets at the Electricity Supply Board's Ringsend (Dublin) power station has been undergoing tests following installation. It is expected that the second machine will start operating next Dec., while the third is scheduled for commissioning next summer. Ringsend power station, which is to have four 200 klb/hr boilers, designed for coal or oil burning, is sited on what were previously tidal flats on the south bank of the River Liffey estuary, about a mile from the Pigeon House station. The station's 250 ft high chimney stack is now Dublin's tallest structure.

Hertfordshire

Further protests have been made at another section of the proposed 275 kV transmission line, in this case the part which would cross the Moor Park region. Rickmansworth U.D.C. apparently made no earlier objection to the line because they thought that the siting of the proposed radar station near Sandy Lodge would influence the route of the power line. But the scheme for the radar station has since been abandoned. The council has now suggested an alternative route for the pylons, along the line of the Grand Union canal. The matter is also to be raised in Parliament by Mr G. Longden, M.P. for South-West Herts, we understand.

Norfolk

As part of its second five-year programme of rural development, the Eastern Electricity Board last week connected up the secluded village of Burston. The inauguration ceremony was carried out by Mr A. N. Wright, M.B.E., J.P., chairman of the Depwade R.D.C. Our accompanying photograph, taken on the occasion, shows l. to r., Mr E. C. Burton, Electricity Service manager, Diss branch; Mr P. Sydney, manager, Suffolk sub-area; Mr A. N. Wright; and Mr J. H. Shepherd, manager, Beccles district. The Board hope that by 1958 they will have brought electricity to 110,000 rural premises (including about 12,000 farms) which were without a supply at the time of nationalisation.

At the switching-on ceremony

Sheffield

A new 33 kV primary substation was inaugurated last weekend at Marmion Rd, Eccleshall, by the Lord Mayor of Sheffield, Alderman J. Curtis. Construction of the substation was a major engineering feat, apparently. Excavations had to be made in an embankment, the latter being held up by a concrete retaining wall to prevent it tilting towards the substation.

Tyrone

The Omagh R.D.C. has approved a resolution protesting against guarantee payments being called for in connection with the installation of electricity in rural areas. One member declared that in urban areas people who built houses paid a flat rate for electricity, but the farmer was called upon to pay exorbitant guarantees.

Wales

The largest rural electrification scheme so far carried out in Cardiganshire and Carmarthenshire was officially switched on at Capel Evan a few days ago. Estimated to cost £41,000, the scheme covers about 6,400 acres and will serve 100 farms and 89 private properties. In many places the Capel Evan district is heavily wooded and split by steep valleys. One of the most difficult spots was a valley at Pentre-isaf where pylons on each side of the valley were separated by a distance of 300 yards. Coastguard type rocket apparatus was used and the first rocket took the power line cleanly over the trees and landed close to the target pole.

LIGHTING SCHEMES

Newcastle-on-Tyne. T.C. recommended to proceed with £37,765 scheme for converting gas street lighting to electricity in eight districts.

Ormskirk. M.o.T. has approved the U.D.C.'s scheme for improved street lighting in Ormskirk and Burscough, estimated to cost £13,600

Rochdale. T.C. seek consent to borrow £11,015 for converting gas street lights to sodium on the Brimrod and Kilworth estates.

COMPANY ACTIVITIES

ANOTHER warning to copper producers (the price has been over £400 a ton) is contained in the annual statement of Mr James S. Clark chairman and managing director of the Sterling Cable Co. The uncertain supply and price instability of raw materials, particularly copper, causes us constant anxiety, he said, and results in the carrying of larger stocks than would be necessary under more stable conditions. A recent move on the part of one of the larger producers of refined copper who stabilised the price reflects their fears that the present inflated price will encourage the use of aluminium in fields where copper has so far reigned undisputed. The greater proportion of Sterling's output is sold overseas which is a refreshing statement in a year when exports seem to be flagging.

Efco formerly the Electric Furnace Co., is a company worth watching. According to the chairman the order book is in a most satisfactory condition while the development of nuclear power favours its activities. Rising costs may affect the near-term outlook but over a period the outlook is undoubtedly excellent. During the past year consolidated trading profits rose from £285,000 to a record £310,000. After payment of tax the 12½% dividend was covered nearly six times over. Quoted around 45s. the dividend yield is over 5½% and the earnings yield 31%.

Hackbridge Cable Holdings has had an excellent year. The dividend goes up to 25% as compared with 20% paid ever since incorporation in 1948. Consolidated trading profits of £582,000 compares with £444,770. All units, including newly acquired subsidiaries participated in the improvement according to Sir Wavell Wakefield the chairman. What is most interesting is the lack of complaint about rising costs and copper prices which is so prevalent elsewhere.

Congratulations to Mr Ernest Shipton of E. Shipton (Holdings) for the excellent results of his first public working period. Trading profits for 12 months to Mar. last were £71,000 against £45,000 forecast. Dividend is 22½% against an estimate of 17½%. At 5s. 3d. ex.d. the 2s. Ordinary yield 8·6%.

Mr Jules Thorn chairman of Thorn Electrical Industries in conjunction with Sylvania Electric Products Inc. of New York seeks to break the "picture tube ring." He intends to set up a new factory on a 50-50 basis with the American company to turn out first, 21 in. tubes, and later other sizes, on continuous automatic process, the first of its kind in this country.

There is no export lag with Thorn group, that division having shown the largest turnover on record during the past year.—*From our City Correspondent.*

H. J. Baldwin and Co. Ltd.

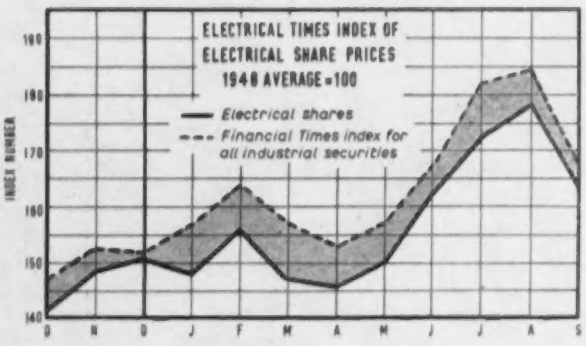
After charging taxation and minority interest, the group trading profit is £71,819 (*£86,054*). A final dividend of 10% again makes the total 20%.

A. C. Cossor Ltd.

The group turnover increased from £7·3 millions to £9·2 millions, including £1·6 millions of exports, with practically the same profit margin as before. This success is reflected in the increased dividend of 15%. The current trading year opened quietly but sales to date have exceeded those for the corresponding period last year, Lord Burghley, the chairman, reports.

Efco Ltd.

The group trading profit of £255,584 for the year ended 31 Mar. last, was a record for the company, Mr D. F. Campbell, the chairman, states, although he adds that some allowance must be made for increases in costs of materials and contract prices. The order book at the present time is satisfactory in volume, but competition is severe and the continued rise in costs cannot be adequately countered by corresponding increases in selling prices, especially in the export market. Rapid progress is being made towards the completion of new factories in Surrey and additional premises have been purchased at Handsworth, Birmingham, he adds.



The much publicised decline in share prices in the past 3 weeks or more is well shown in the accompanying graph. The "Financial Times" index for all industrial shares fell by 16·8 to 168, whilst the "Electrical Times" index for electrical shares fell by 13·4 to 164·3

Hackbridge Cable Holdings Ltd.

All units—including the newly acquired subsidies—have participated in the substantial improvement over the previous years results, Sir W. W. Wakefield, the chairman, reports and a final dividend of

Year to 31 Mar.	£ Trading Profit	£ Net Profit	% on Ord. Earned	% on Ord. Paid	Ord. Price High	Ord. Price Low
1951	247,406	71,247	25	20	15/9	9/9
1952	228,245	87,009	32	20	11/9	9/1
1953	468,308	157,307	59	20	13/–	10/4
1954	500,452*	211,496*	40	20	16/3	11/3
1955	638,819	308,402	38	25	16/1	14/–

*Includes proportion of Bryce group profits for 18 months to 31.3.54.

17½% raises the total distribution to 25%. A further sum of £74,413 has been expended during the year on projects of a capital nature. Development work towards the further improvement of facilities for sheathing cables with aluminium by the direct extrusion process as an alternative to lead, continues satisfactorily.

Kenya Power Co.

Subscription lists are to open in London and Nairobi on 13 Sept. for the £7½ millions of 5½% debenture stock 1975-1985 which is being offered at £101.

Nigerian Electricity Supply Corpn.

Net profit for the year ended 28 Feb. last is £50,671 (*£48,744*). A final dividend of 4% plus bonus 2% again makes the total 10%.

Thorn Electrical Industries Ltd.

Continued expansion in all regions was reported by Mr Jules Thorn, the chairman, at last week's general meeting. At

Year to 31 Mar.	£ Trading Profit	£ Net Profit*	% on Ord. Earned	% on Ord. Paid	Ord. Price High	Ord. Price Low
1951	517,323	155,210	51	10†	12/2	8/3
1952	681,169	195,885	66	12½	8/9	7/–
1953	771,292	192,074	62	12½	13/6	7/10
1954	1,054,348	293,608	97	20	30/9	13/3
1955	1,501,612	532,497	85	15†	33/–	13/1

*Available for parent company.
†Plus 100% capital bonus. †Plus 100% capital bonus.

Merthyr Tydfil, the original lamp factory has been re-equipped with the latest machinery of the firm's own design and manufacture, and a duplicate factory of the same size, now being erected, will begin production towards the end of this year. When completed it will probably be the largest unit in Europe producing lamps of that type. Also claiming to be the largest producers of fluorescent tubes in Gt. Britain and amongst the three largest in the tungsten filament field, Thorn's were responsible for over 70% of the total exports of fluorescent tubes from this country.

Dividends Declared

Chloride Electrical Storage Co. Interim 5% (*same*).

Hubert Davies and Co. Interim 4% (*same*).

Rheostatic Co. Interim 6% (7½%) but on larger capital.

Telegraph Condenser Co. Interim 5% (*same*).

Walsall Conduits. Interim 7½% on larger capital.

COMMERCIAL INFORMATION

Contracts Open at Home . . .

Dates given are the final for receipt of tenders unless otherwise stated.

9 Sept.—Belfast T.C. Extensions to and modifications on existing Reyrolle switchboards at six substations; and five outdoor transformers.—Advertised in 21 July issue.

9 Sept.—Bilston T.C. Group A lamps on concrete columns and Group B lighting units on various roads.—See 18 Aug. issue.

9 Sept.—Dumfries. Installation in new laboratory at Royal Infirmary.—See 25 Aug. issue.

9 Sept.—Edinburgh T.C. Installation in houses in Coniston area and Loaning Rd. —See 11 Aug. issue.

9 Sept.—Middlesex. Lamps in 6 months from 1 Nov.—See 1 Sept. issue.

9 Sept.—Spenborough T.C. Class B street lighting in town centre, and Childs Lane and Sunnyside estate, Roberttown.—See 1 Sept. issue.

10 Sept.—Bredbury and Romiley U.D.C. Wiring 56 houses on Cherry Tree estate, Romiley.—See 25 Aug. issue.

10 Sept.—Cambridge T.C. Lamps in year from 1 Oct.—See 18 Aug. issue.

10 Sept.—Mitcham T.C. Concrete columns with sodium discharge lamps, etc., for street lighting improvements.—See 25 Aug. issue.

10 Sept.—Northumberland. Lamps in 6 months from 1 Oct. to S.E. Hospital Committee.—See 1 Sept. issue.

10 Sept.—Wirral U.D.C. 1¼ miles of Group B street lighting at Heswall.—See 18 Aug. issue.

12 Sept.—N. Ireland. Installation in Ministry of Commerce factory, Enniskillen. —See 1 Sept. issue.

12 Sept.—Isle of Ely. Electrical, including heating, installation at county library, March. Apply by above date to County Architect, County Hall, March. Deposit £2. 2s.

12 Sept.—Sutherland. Installation in Durine J.S. school extensions, Durness.—See 18 Aug. issue.

13 Sept.—Lancashire. Electrical installation at Prestwich parish C.E. school and Horwich secondary modern school. Also, installations in five schools. Separate contracts. Apply by above date quoting ref. A/MG to County Architect, P.O. Box 26, County Hall, Preston.

14 Sept.—East Grinstead U.D.C. In-filling existing 140 W sodium discharge lighting along London-Eastbourne Rd.—See 18 Aug. issue.

14 Sept.—Tunbridge Wells T.C. Concrete street lighting columns in Class B with lanterns, etc., for Sherwood estate extensions, Liptraps Lane and industrial estate.—See 11 Aug. issue.

15 Sept.—Belfast T.C. Electrical installation in Mersey St primary school. Office of Education Architect, 40 Academy St.

15 Sept.—Durham. Supply, erection of 15 lighting columns and ancillary equipment at Thunford Inn Roundabout. County Engineer and Surveyor, Aykley Heads, Durham.

15 Sept.—Luton T.C. Installation in flats in Bailey St.—See 1 Sept. issue.

16 Sept.—N. Ireland. Installation in H.Q. and fire station in Thomas St, Portadown.—See 1 Sept. issue.

16 Sept.—Sunderland T.C. Installation at Springwell Rd Health Centre.—See 1 Sept. issue.

17 Sept.—Bebington T.C. Automatic private telephone exchange in new town hall.—See 11 Aug. issue.

17 Sept.—Belfast. Two electrically-driven drainage pumps at Alexandra Graving Dock.—See 18 Aug. issue.

17 Sept.—Eire. Installation at Athlone District Hospital.—See 25 Aug. issue.

17 Sept.—Wakefield. Hospital Management Committee No. 9 is compiling list of firms from whom tenders may be invited.—See 25 Aug. issue.

19 Sept.—Kingston-on-Thames T.C. Six sets of electrically driven vertical unchokeable sewage pumps.—See 18 Aug. issue.

19 Sept.—Waterford (Eire). Installation at Central Technical Inst., Parnell St.—See 28 July issue.

20 Sept.—Dublin T.C. Supply of 1,000 fuse boxes for Public Lighting Dept. Finance Dept., City Hall.

20 Sept.—Minehead U.D.C. Steel columns with fluorescent lanterns and ancillary equipment along A.39.—See 1 Sept. issue.

20 Sept.—Whitley Bay T.C. Rewiring of 50 houses in Hillheads Rd, Kingsley and Belvedere Aves. Borough Engineer, E. Roberts, Municipal Offices. Deposit £1. 1s.

22 Sept.—Belfast R.D.C. Group B fluorescent lanterns, lamps, control gear, concrete columns, etc.—See 1 Sept. issue.

22 Sept.—Belfast T.C. 10-ton overhead travelling crane and two electric hoist blocks for Power Station West extension. —Advertised in 11 Aug. issue.

22 Sept.—Chard T.C. Sodium units with columns, control gear, etc., for street lighting.—Advertised in 1 Sept. issue.

22 Sept.—Co. Antrim. Electrical installation at Moyle Hospital, Larne. Chief Engineer to N.I. Hospitals Authority, Victory Buildings, 44 Queen St, Belfast. Deposit £3. 3s.

22 Sept.—Keynsham (Bristol) U.D.C. Supply of 28 street lighting columns and fittings in section A of Park West housing estate. Engineer and Surveyor, Council Offices. Deposit £2. 2s.

23 Sept.—Brentford and Chiswick T.C. Supply, erection and wiring of 225 street lighting columns, mercury vapour lanterns and control gear, along various roads. Borough Engineer, Town Hall, Chiswick, W.4. Deposit £2. 2s.

23 Sept.—Midlothian. Sodium lamps on concrete columns along A.6094, and conversion scheme on B.7003 at Rosewell.—See 1 Sept. issue.

26 Sept.—Mynyddislwyn U.D.C. Group A sodium street lighting on about three miles of A.4048 and A.472.—See 1 Sept. issue.

26 Sept.—Newcastle-on-Tyne. Two 6-ton semi-portal electric cargo cranes for Tyne Commission Quay extension.—See 11 Aug. issue.

26 Sept.—West Riding. Rewiring installation at Mill Lane primary school.—See 1 Sept. issue.

27 Sept.—Derby T.C. Supply of 33 Group A sodium lighting units for Duffield Rd, A.6. Borough Engineer and Surveyor, Council Hse, Corporation St.—Advertised in this issue.

29 Sept.—Belfast T.C. Renewal of electrical installation at Donegall Rd branch library. J. McCandless, consulting engineer, 6 Murray St, Belfast. Deposit £3. 3s.

29 Sept.—Co. Antrim. Electrical installation in proposed extension to Lisburn technical school. J. McCandless, consulting engineer, 6 Murray St, Belfast. Deposit £3. 3s.

30 Sept.—Durham. Supply of electrical equipment for residential school. G. H. Metcalfe, director of education, Shire Hall, Durham.

30 Sept.—Tyldesley U.D.C. Dismantling of existing installation and complete rewiring of town hall. Engineer and Surveyor, P.O. Box 7, Town Hall. Deposit £2. 2s.

1 Oct.—Bristol. Welding equipment for College of Technology.—See 25 Aug. issue.

1 Oct.—Islington B.C. Rewiring of the Council's Public Baths, Greenman St. —Advertised 14 July issue.

3 Oct.—Dumfries. Heating and lighting installations in new unit at Cresswell Maternity Hospital. Apply by 15 Sept. to

Your Queries Answered

Readers are invited to make use of our free enquiry department which possesses wide resources including an index of trade information with over 100,000 entries

A Selection from the 128 queries answered this week

"Gabriel" inspection lamp, makers of? C.E.—Gabriel and Co., Ltd., 4/5 AB Row, Birmingham 4.

"Invisaflex" adjustable fittings, suppliers of? S.E.—Electricity Services Ltd., 6 Laurence Pountney Hill, E.C.4.

Sub-fractional h.p. motors for electric toys, makers of? G.T.G.—Lines Bros. Ltd., Merton, S.W.19.

Self-contained motorised rotary ironer, makers of? G.B.—Oprim Sales, Albion Works, Park Way, Edgware; James Stott and Co. (Engineers) Ltd., Vernon Works, Oldham; Industrial Machinery and Appliance Co., 11 King St, Wolverhampton.

"Walsall" voltmeter, makers of? P. and A.—Walsall Electrical Co., Ltd., 61 Bridge Street, Walsall.

"Peak Penguin" refrigerators, makers of? B.—R. H. Ingham and Co., Ltd., 150 Moore St, Sheffield 3.

"V" infra-red grill, makers of? T.E.—"V" (Development and Trading) Ltd., 22 Clifton Rd, W.9.

J. Brownlee, secretary, Dumfries and Galloway Hospital Board, Royal Infirmary, Dumfries.

10 Oct.—Birmingham. Electrical installation at Norton Green sewage purification works.—See 1 Sept. issue.

14 Oct.—Edinburgh T.C. Installation in 47 houses in Craighall Rd, Eversley. Apply by 1 Sept.—See 18 Aug. issue.

No date stated.—Hull. Lamps in year from 1 Oct. for Hull (A) Hospital Committee.—See 1 Sept. issue.

No date stated.—N. of Scotland H.E. Board. Lighting, heating, main and auxiliary cabling installation for Achanalt power station.—Advertised in 1 Sept. issue.

. . . and Overseas

Details of items marked * may be obtained on application to the Board of Trade, Lacon House, Theobalds Rd, W.C.1, quoting reference.

22 Sept.—Egypt. Supply, erection of 6·6/3·3 kV transformer substation at Helwan, with transformers, switchgear equipment, accessories, etc. Cairo Electricity and Gas Admin. 53, Sh., 26 July (Fouad El Awal), Cairo. B.o.T. (Ref.: ESB 18310/55).*

22 Sept.—Persia. Signal and communication equipment: 400 line PAX switchboard, systems, teleprinter switching systems, teleprinters, PAX exchanges, call box alarm systems, call boxes, magnetic tape recorders, emergency power supplies, spares. Bid No. 65-22-024-5-50942. Procurement Officer, U.S. Operations Mission to Iran, Sepah Building, Tehran. B.o.T. (Ref.: ESB 17720/55).*

27 Sept.—Australia. Manufacture, supply, etc., of two electrically driven, vertical spindle centrifugal type pumping units coupled to electric motors by intermediate shafting, with starters, for Prospect pumping station. Contract 2816-W. Metropolitan Water Sewerage and Drainage Board, Sydney, N.S.W. B.o.T. (Ref.: ESB 17448/55).

29 Sept.—Portuguese East Africa. Supply of 60 portable electrical accumulators. 30 insulated copper connecting cables (50 mm 2 section), and 16 portable charging plants. Commando Militar de Angola, Quartel General, Luanda. B.o.T. (Ref.: ESB 17981/55).*

30 Sept.—New Zealand. Contract No. 507 invites tenders for supply of 11/6·6 kV fuse switches and ring main switchfuse units. Dunedin City Corpn's Electricity Dept., Dunedin. B.o.T. (Ref.: ESB 18204/55).*

1 Oct.—Luxembourg. Supply, erection, etc., of electrical equipment, including alternators, transformers, switchgear, etc., for Esch-Sur-Sure barrage works. Ministère des Transports et de l'Electricité, 4 Boulevard Roosevelt. B.o.T. (Ref.: ESB 17475/55).*

1 Oct.—Turkey. Supply of 27 diesel generator sets to be installed at nine radar stations (3 sets at each) in Turkey. N.A.T.O. Infrastructure Contract. Tenders invited by Min. of National Defence. B.o.T. (Ref.: 1071/55).*

4 Oct.—Australia. Contract 447 issued by Electricity Commission of N.S.W. calls for nine 60 MVA, 132 kV transformers, outdoor, oil-immersed, self-cooled and air blast, double wound, 3-phase, three-winding, for Warringah, Bankstown and Guildford substations. Commission is at Box 5257, G.P.O., Sydney. B.o.T. (Ref.: ESB 1824/55).*

6 Oct.—Uruguay. Tenders (No. 203/55; specif. No. 2391) invited for supply of 650,000 metres one-pair lead covered insulated telephone cable and accessories. Administracion General de las Usinas y los Telefonos del Estado, Montevideo. B.o.T. (Ref.: ESB 17954/55).*

7 Oct.—South Africa. Tenders (E.2611) invited for two 15 MVA three-phase automatic on-load tap changing transformers. Normal voltage ratio at no load 33,000/6,600 V. Electricity Dept., City of Durban. B.o.T. (Ref.: ESB 17699/55).*

7 Oct.—Uruguay. Supply of total of just over 152,000 metres of lead covered paper insulated telephone cable. Specification No. 2396, Tender No. 4204/55. Administracion General de las Usinas, Electricas y los Telefonos del Estado, Montevideo. B.o.T. (Ref.: ESB 17955/55).*

19 Oct.—South Africa. Supply of 66 kV switchgear and accessories required by City of Cape Town Electricity Dept. Specif. No. 1852/1955. City Electrical Engr., Strand St. Deposit £100. B.o.T. (Ref.: ESB 18380/55).*

21 Oct.—Australia. Supply of (*a*) 3·3 kV air break circuit-breaker equipments of 150 MVA breaking capacity; (*b*) 415 V switchgear of 25 MVA breaking capacity; and (*c*) 415 V small power distribution boards; all for Tennyson power station. Contract E25/55. Brisbane City Council, Electricity Dept. B.o.T. (Ref.: ESB 17998/55).*

27 Oct.—New Zealand. Tenders (SC 3764) invited for supply of 480 miles of steel cored aluminium conductor and accessories for 220 kV line between Islington and Kikiwa. Stores Manager, State Hydro-Electric Dept., P.O. Box 8025, Wellington. B.o.T. (Ref.: 17722/55).*

28 Oct.—New Zealand. Supply of considerable quantities of suspension and strain strings of insulators for Islington-Kikiwa 220 kV line. Tender No. S.C. 3765. Stores Manager, State Hydro-Electric Dept., Wellington. B.o.T. (Ref.: ESB 17723/55).*

26 Nov.—India. Tender No. G.S. 55/1 calls for supply of power station equipment, comprising water turbines, generators, transformers, switchgear and ancillary equipment, for Neriamangalam hydro-electric project. Stores Purchase Committee, Trivandrum, Govt. of Travancore-Cochin. B.o.T. (Ref.: ESB 17476/55).*

PRICES of cable metals and other materials

Figures quoted are the official prices ruling on Tuesday, 5 September

	£ per ton	Weekly change £	Price last year £
COPPER, standard class A (settlement)	402	+2	246
,, (3 months)	395	—	239½
R.S.T. (Rhodesian Selection Trust) group price*	360	+45	—
LEAD, refined pig, min. 99·97% purity (cash)	107½	+½	100½
,, (3 months)	107½	+½	99½
TIN, refined, min. 99·75% purity (settlement)	743	−2½	734
,, (3 months)	744	−2	736
ALUMINIUM, ingots 99·99·5%	171	—	156
ZINC, virgin, min. 98% purity (cash)	91½	+1	81
,, (3 months)	90½	+½	80½
RUBBER No. 1, RSS. spot (per lb.)	43½d.	+2½d.	20½d.
,, c.i.f. basis, ports. Nov. (per lb.)	42½d.	+2½d.	20½d.
ARMOURING :			
Galv. Steel Wire (0·104 in.)	56½	—	52
Mild Steel Tape (0·04 in.)	43½	—	40½

(*Fixed price c.i.f. U.K., now subject to change at 24 hours' notice, to "consumers willing to instil a degree of stability into the resale price.")

Trade Notes

Change of Address. Bilton Smith Ltd. are now at "Edgbaston," Harlequin Ave, Brentford, Middx. Telephone: Ealing 1540.

Contracts Placed

Chepstow T.C. Replacement of existing gas lamps by electric street lighting, General Electric Co., £2,712.

Hull T.C. Diesel-electric pumping plant at Springhead station, Harland Engineering Co., Ltd., £73,188.

Isle of Ely. Electrical installation at College of Further Education and Horticultural Inst., Ely Electrical Co., £5,230.

London. Renewal and improvement of installation at Wandsworth county school, Powerlite Electrical Installations Ltd., £4,988.

Ramsgate T.C. Conversion of street lighting from gas to electricity in various streets, S.E. Electricity Board, £14,403.

Redditch U.D.C. Supply and erection of 25 sodium lamps in Ipsley St and Holloway Lane. Midlands Electricity Board, £1,214.

Southport T.C. Following tenders accepted for street lighting: supply of lanterns and equipment Metropolitan-Vickers Electrical Co., Ltd., £11,457; supply of concrete columns, Stanton Ironworks Co., Ltd., £5,432; erection of lanterns and columns, W. J. Furse and Co. (Manchester) Ltd., £5,711; and supply of service cables, Merseyside and N. Wales Electricity Board, £10,096.

Waltham (Essex). Supply and erection of 11,000 V switchgear and auxiliary equipment at Rammey Marsh pumping station for Metropolitan Water Board, Johnson and Phillips Ltd., £2,695.

TRADE MARKS

This information is extracted from the Official Journal by permission of the Controller.

Furmaray. 742,601. Class 9. Transmitting apparatus. 133 Fonthill Rd, Finsbury Park, N.4.

Commaster. 742,337. Class 9. Telephone and loudspeaker apparatus for intercommunication. Neltic Ltd., Neltic Hse, Charteris Rd, N.4.

Idotron. 742,261. Class 9. Photoelectric measuring devices. J. F. Crosfield Ltd., 2 Elthorne Rd, N.19.

Electrollo. 742,529. Class 7. Washing machines. 742,530. Class 9. Vacuum cleaners. Cleaner-Homes Ltd., 49/51 Crown St, Reading, Berks.

Ab-fi. 731,486. Class 9. Radio and television apparatus, etc. Pamphonic Reproducers Ltd., Radio Works, Cambridge.

BUSINESS PROSPECTS

Home

Acton. Apprentice training school in Chandos Rd being planned by Rotax Ltd. Outra Belting and Rubber Co., Ltd., are proposing two-storey addition in Minerva Rd.

Aldershot. Revised sketch plans prepared for extension to county high school.

Aycliffe (Dur). Additions covering some 30,000 sq ft proposed at factory of E.M.V. Engineering Ltd.

Barrow-in-Furness. Planning permission sought by British Cellophane Ltd. for factory at Sandscale.

Battle (Sus) R.D.C. Erection of 42 houses at Asten Fields. Architect A. H. Neave, 38 Mount St.

Bedford T.C. It is proposed to erect ten- or eleven-storey flats in St. Johns St

Bilston. Cannon Industries Ltd., Deepfields, to erect new factory which is estimated to cost £2 millions.

Birmingham. Plan approved for erection of multi-storey car park at junction of the Bull Ring and Moor St. Cost estimated at £1,117,000.

Factory to be built in Upper Gough St for Chroframes Ltd., of Wheeley Lane.

Burnley. Plans being prepared for grammar school at Ivy Bank estimated to cost £177,725.

Cardiff. S.P.D. Ltd. to build new premises on Newport Rd industrial estate. Consulting engineers are F. S. Snow and Partners, Monroe Building, Wellington St, London, W.C.2.

Carlisle T.C. Erection of 108 houses and 42 flats and bungalows under Morton contract No. 3. City Surveyor, 18 Fisher St.

Chester. T.C. recommended to lease 1½ acres on Sealand trading estate to Raleigh Cycle Co., Ltd.

Chobham (Sur). County secondary school to be built in Sunningdale Rd.

Coulsdon and Purley. Approval given for erection of primary school in Hayes Lane, Kenley.

Derby. Factory proposed on industrial estate by Platers and Stampers Ltd., 14-18 Holborn, E.C.1. Architects are Elliott, Cox and Partners, Coastal Chambers, 172 Buckingham Palace Rd, London, S.W.1.

Dumbartonshire. Plans of Singer Sewing Machine Co., Clydebank, have been approved for new premises to cost £250,000.

Dundee. Factory to be built at Kilspindie Rd for Scottish Industrial Estates Ltd. for lease to Astral Equipment Ltd.

Easington. Cordingley and McIntyre, The College, Durham, are architects for proposed technical college.

East Riding. Construction of family group home at Anlaby. County Architect, County Hall, Beverley.

Garscadden. Projected industrial development in Glasgow includes large factory at Garscadden to be built by Scottish Industrial Estates Ltd., for occupation by Goodyear Tyre and Rubber Co. (Great Britain) Ltd.

Glasgow. Plans approved for eight two-stream primary schools on various sites.

Guildford. Friary Holroyd and Healy's Breweries are to spend £250,000 on expansion.

Hinckley U.D.C. Thirty-six flats to be built in King George's Way.

Honiton (Dev). New wing at Marlpits Hospital proposed by E. Devon Hospital Committee. Cost estimated at £30,000.

Huddersfield T.C. Erection on Salendine Nook site of secondary modern school (£200,000), boys' grammar/technical school (£300,000), and girls' grammar/technical school (£240,000). Names to H. Bann, town clerk, Town Hall.

Ilkeston. Factory to be built in Hallam Fields Rd for Newsum Engineering Ltd., of Rutland St.

Inverness. J. A. Dixon Ltd., of Forest Side, Newport, I.o.W., are to build factory on Longman industrial estate.

Lanarkshire. Architect for new factory for E. Kilbride Development Corpn. is Frank G. Scott, Torrance Hse.

Liverpool. Extension to College of Building (£151,500), and first instalment of Mabel Fletcher technical college (£233,500), included in 1956 programme. Erection of 888 dwellings and 206 garages on Lee Park estate, Gateacre, a block of 40 ten-storey flats in Mitylene St, and two houses and surgery on Speke estate. City Architect, Blackburn Chambers, Dale St, Kingsway.

Also, land in Shaw Rd on Speke industrial estate to be leased to Liverpool Packing Case Co. Ltd., 55-57 Park Rd, for erection of works.

Luton. Plans approved for office block in Leicester Rd for Alcock (Peroxide) Ltd., Chaul End Lane. British Tabulating Machine Co., Ltd., of Letchworth, are to extend office accommodation in Hitchin Rd.

Middlesbrough. Proposals of Sherwood Bros., Ltd., approved for erection of garage, showroom, etc., in Morton Rd. New police headquarters to be built and has been approved by Home Office.

Milnrow U.D.C. Erection of 22 bungalows on Bentgate and Halliwell St sites. Council's Architects, W. Thorpe and H. H. Smith, 65 Barton Arcade, Manchester 3.

Mitcham. Fairclough and Morris, 14 Irving St, London, W.C.2, are architects for factory proposed by Hancock, Corfield and Waller Ltd.

Monmouth. Factory in Hadnock Rd to be built by T.C. to be taken over by Scotts Engineering (Newport) Ltd.

Newcastle-on-Tyne. British Railways have long-term plan for rebuilding Forth Goods Station and new goods station at Gateshead.

Newcastle-on-Tyne T.C. Construction of 106 houses on Kenton North estate. City Architect, 18 Cloth Market.

Nottingham. Scheme prepared by G. A. Jellicoe, architect, 12 Gower St, London, W.C.1, for an hotel, flats, open-air theatre and gymnasium at Nottingham University.

Renfrew. Plans prepared by Scottish Advisory Council for lounge at new terminal buildings, at Renfrew Airport.

Rotherham. Houston and Forbes, 30 Burnley Rd, are architects for factory to be built for Glover and Main Ltd.

Also, Montgomery, Skinner and Co., Pagoda St, Sheffield, propose new factory in Brinsworth St. James Totty and Co., Imperial Buildings, Rotherham, are architects.

Sheffield. Factory occupying 300,000 sq ft opposite their Victoria Works proposed by Laycock Engineering Ltd. This will cost about £500,000, but in addition work has begun on £90,000 extension to the same works, and premises in Liverpool St, Attercliffe, are being acquired.

The proposal to erect 1,000 dwellings on Gleadless Valley estate, has been approved.

Slough. St. Joseph's secondary modern school to be built by R.C. Authorities in Shaggy Calf Lane. Architects are Sterrett and Blovet, 17 Ashley Pl, London, S.W.1.

Stafford T.C. Plans being prepared for 86 dwellings on Highfields estate.

Staffordshire. Scheme approved for improved lighting at Leek county secondary modern school. Cost estimated at £2,000.

Stoke Newington B.C. Architects for proposed redevelopment of Lordship Rd site will probably be Howes and Jackman, 1 Verulam Buildings, Grays Inn, W.C.1. 125 dwellings to be built on the site.

Tynemouth T.C. Application received for factory site at Percy Main on which to build works to employ 1,200 persons.

Vaynor and Penderyn R.D.C. Erection of 32 houses and 8 bungalows at Trefechan. Council's Architect, G. H. Griffiths, 2 Museum Place, Cardiff.

Waterford. Plans approved for extension and reconstruction of Dungarvan district hospital for Waterford Board of Assistance. Estimated cost £43,000.

Workington. £87,000 scheme by Newcastle Hospital Board approved for new maternity unit at Workington Infirmary. Quantity surveyor is J. T. Hart, Natproban Chambers, Carlisle.

Gazette Announcements

COMPANIES ACTS

Henray Electrical Co., Ltd. Last day for receiving proofs in respect of intended dividends, 16 Sept. Liquidator is D. Morgan, 100 Park St, Grosvenor Sq, London, W.1.

Wonder Washing Machine Co., Ltd. Meeting of creditors will take place at offices of O. Sunderland and Sons, C.A., 15 Eastcheap, London, E.C.3, on 16 Sept. at 11.45 a.m.

Eckington Electric Supply Co., Ltd. Meeting of members will be held at Council Offices, Church St, Eckington, on 5 Oct. at 6.15 p.m., to receive liquidator's report.

Voluntary Liquidation

Newport's Electrics (Southampton) Ltd., electrical contractors. At statutory meeting of creditors it was reported members had passed resolution for voluntary liquidation with Mr N. W. Osborne as liquidator. After discussion creditors resolved to confirm the appointment. Committee of inspection was also appointed. According to approximate statement of affairs liabilities amounted to £10,101, of which £5,794 was due to trade creditors; £94 expense creditors; £3,205 to the Bank; and £1,007 on loan account. Assets estimated to realise £1,663, less £229 for preferential claims, leaving net assets of £1,434, or a deficiency of £8,666. Assets included sum of £1,226 for work-in-progress, and note on statement of affairs explained valuation was estimated value of work done on various contracts, less payments received on account. Whether that amount would be realised depended upon whether contracts could be completed.

Overseas

U.S.A. The Tellepsen Construction Co., 1710 Telephone Rd, Houston, Texas, wish to contact U.K. manufacturers of electric light fittings, chandeliers, etc., of highest quality and modern design, with fixtures for lamps in screw sockets for fluorescent lights.

NEW COMPANIES

Extracted from the Register issued by Jordan and Sons, Ltd., 116 Chancery Lane, W.C.2.

Maynards (Electrical) Ltd. 226 Southfield Rd, W.4. To take over business of electrical engineers carried on as "Maynards," at Acton, W.4, etc. Nom. cap.: £2,000. Dirs.: H. A. Prior, E. G. Prior and H. M. Prior.

M.B.I. Electrical Co., Ltd. 245 High Rd, Kilburn, N.W.6. Manufacturers of and dealers in electric fittings, etc. Nom. cap.: £1,000. Dirs.: R. Brosan and Margaret Brosan.

Parker-Richards Development Co., Ltd. 13 Bloomsbury Sq, W.C.1. To acquire letters patents, etc., and carry on business of business consultants, office organisers, manufacturers of and dealers in radio, television, refrigerators, etc. Nom. cap.: £100. Dirs.: H. Parker and A. J. Richards.

Marquess Products Ltd. Bristol House, 18/23 Holborn Viaduct, E.C.1. Manufacturers of and dealers in electrical fittings and appliances, radio and television sets, etc. Nom. cap.: £5,000. Dirs.: L. W. Sefton and A. Townsend.

Cumming-Davies Ltd. 10 Station Bldgs, Altrincham, Ches. Manufacturers of and dealers in domestic equipment, electrical equipment, etc. Nom. cap.: £100. Dirs.: J. A. Cumming, Mrs C. Cumming and R. E. Davies.

Neosign Co., Ltd. 53 Kings Cross Rd, W.C.1. Manufacturers of and dealers in electrical signs, advertising appliances, etc. Nom. cap.: £500. Dirs.: K. E. Dunn and Annie Dunn.

MEETINGS TO NOTE

THURSDAY, 8 SEPT.

INCORP. PLANT ENGRS. (Glasgow). "Developments in Machine Tools." J. R. Young. Building Centre, Sauchiehall St, 7 p.m.

INCORP. PLANT ENGRS. (Merseyside). "Atomic Energy." J. A. Dixon. At Chester.

FRIDAY, 9 SEPT.

A.S.E.E. (Bristol and W. England). Business meeting and American Electrical Films. Grand Hotel, Bristol, 7.30 p.m.

MONDAY, 12 SEPT.

A.S.E.E. (Central London). "Television—Modern Practice." St. Ermin's Hotel, Caxton St, S.W.1, 7 p.m.

A.S.E.E. (N.W. London). Chairman's reception at Century Hotel, Forty Ave, Wembley Park, 7.30 p.m.

BIRMINGHAM ELECTRIC CLUB. Presidential address by H. C. Fox. Grand Hotel, 6.15 p.m.

WEDNESDAY, 14 SEPT.

A.S.E.E. (S.W. London). "Industrial X-rays." F. L. Veale. Guild Hse, 32 Worple Rd, Wimbledon, 8.15 p.m.

A.S.E.E. (York). "Miniature Circuit-Breakers." F. Grant. The Shambles Cafe, 7.15 p.m.

A.S.E.E. (Birmingham). "Relays and Automatic Control in Industry." Dr W. L. Stern. Chamber of Commerce, New St, 7.15 p.m.

THURSDAY, 15 SEPT.

A.S.E.E. (Watford). "Electricity in the Aircraft Industry." E. Wade. Clarendon Hotel, Station Rd, 8.15 p.m.

INCORP. PLANT ENGRS. (Blackburn). "Corrosion—Prevention and Control." Dr. G. Butler. Golden Lion Hotel, 7.30 p.m.

SATURDAY, 17 SEPT.

A.S.E.E. (Oxford). "Electric Heating, Heat Pumps and Hot Water from the Fridge." A. W. Bates. Y.M.C.A., 10 George St, 6.30 p.m.

Mitchell's Home Services Ltd. 16 Grange Rd, Southwick, Sussex. Electrical, wireless, radio and television contractors and engineers, etc. Nom. cap.: £150. Dirs.: D. W. Mitchell, A. E. Hall and J. H. Munn.

Tempair (Dorking) Ltd. Vincent Works, Vincent Lane, Dorking, Surrey. Manufacturers and designers of and dealers in air conditioners, temperature control equipment, etc. Nom. cap.: £6,000. Dirs.: N. W. Wilkinson, J. P. Scott, P. J. Street and R. A. Walker.

Elliottomation Ltd. Century Works, Conington Rd, S.E.13. Manufacturers, assemblers, repairers and dealers in articles in connection with indication, control and operation by mechanical, electrical, electronic, pneumatic and other means of manufacturing processes, etc. Nom. cap.: £100. Dirs.: L. Bagrit, L. L. Ross and E. O. Herzfield.

Elliott Automation Ltd. Century Works, Conington Rd, S.E.13. Manufacturers, assemblers, repairers and dealers in articles in connection with indication, control and operation by mechanical, electrical, electronic, pneumatic and other means of manufacturing processes, etc. Nom. cap.: £100. Dirs.: L. Bagrit, L. L. Ross, and E. O. Herzfield.

King's Radio and Electrical Co., Ltd. Melbourne Works, Melbourne Sq, Brixton, S.W. Nom. cap.: £1,000. Dirs.: H. W. King, Margaret L. King, and Gladys M. King.

G. L. Davies (Engineers) Ltd. 2 Dowlais Arcade, Mount Stuart Sq, Cardiff. Welding engineers, etc. Nom. cap.: £100. Dirs.: G. L. Davies and Mrs E. E. Davies.

Auto Supplies (Electrical) Ltd. 46 Lynton Rd, Peterborough. Manufacturers of and dealers in electrical equipment for motor cars, etc. Nom. cap.: £1,000. Dirs.: J. W. Johnson and Daphne J. Johnson, J. Dawson, Ena Dawson and S. H. Hibbins.

John Hardiment (Heating) Ltd. The Causeway, Burwell, Cambs. Heating, ventilating, air conditioning, dust and fume collecting, drying, dehydration, electrical and general engineers, etc. Nom. cap.: £2,000. Dirs.: J. C. H. Hardiment and Mrs M. Hardiment.

Panellit Ltd. Dalston Gdns, Stanmore, Middx. Manufacturers, importers and exporters, designers and constructors of control equipment, instruments, valves, appliances and apparatus of all kinds for use in the field of automation, electronics and instrumentation, etc. Nom. cap.: £100. Dirs.: to be appointed by subs. Subs.: C. Surtees and B. W. Gould, 116 Old Broad St, E.C.2.

Littlewood Bros. (Electronics) Ltd. Nom. cap.: £100. Dirs.: D. Littlewood, 79 Underwood Rd, Birmingham, 20, and D. G. Herbert. Sub.: R. A. Flamank, 117 Church Lane, Birmingham, 20.

Diponics Ltd. Electrical engineers and contractors, etc. Nom. cap.: £100. Dirs.: to be appointed by subs. Subs.: Jean Herbert and T. A. Herbert, 156 Strand, W.C.2.

Goodonics Ltd. Heating, hydraulic, gas, electric, turbine, mechanical and general engineers, etc. Nom. cap.: £100. Dirs.: to be appointed by subs. Subs.: Jean Herbert and T. A. Herbert, 156 Strand, W.C.2.

Vanrix Ltd. Heating, hydraulic, gas, electric, turbine, mechanical and general engineers, etc. Nom. cap.: £100. Dirs.: to be appointed by subs. Subs.: Jean and T. A. Herbert, 156 Strand, W.C.2.

Thorn Electrical Industries

A RECORD YEAR

PRESIDING at the Annual Meeting of Thorn Electrical Industries Limited, held in London on 2 Sept., Mr Jules Thorn (Chairman and Managing Director) said:

The trading profit of £1,500,000 represents an increase of almost 50% on last year's trading result.

The proposed dividend of 15% on the doubled ordinary capital is equivalent to 30% in comparison with last year's 20%.

The consolidated balance sheet of the Group, reflecting continued expansion, shows total assets exceeding £9,000,000—an increase of more than £2,000,000 since March 1954.

Atlas Lighting Division

In the face of increasing competition the Atlas Lighting Division continues to expand. This last year has seen considerable changes in the trading structure of the industry, brought about to some extent by the competitive prices at which we have been able to sell high quality lighting products. We shall continue to provide the same measure of healthy competition, independent of price rings, to enable the user to buy the best quality lamps, tubes and lighting fittings at fair and reasonable prices.

During the past year the expansion of our main lamp factory at Merthyr Tydfil has continued. The original factory has been re-equipped with the most up-to-date machinery of our own design and manufacture and a duplicate factory of the same size, now being erected, will begin production towards the end of this year. When completed it will probably be the largest unit in Europe producing lamps of this type. We are the largest producers of fluorescent tubes in Great Britain.

On the commercial side we have been successful in obtaining large contracts from the Government and every class of user. This year we shall be considerably extending our activities in the street lighting field.

Ferguson Radio and TV

The prominent position in the radio and television industry occupied by our Ferguson Division has been further consolidated during the year.

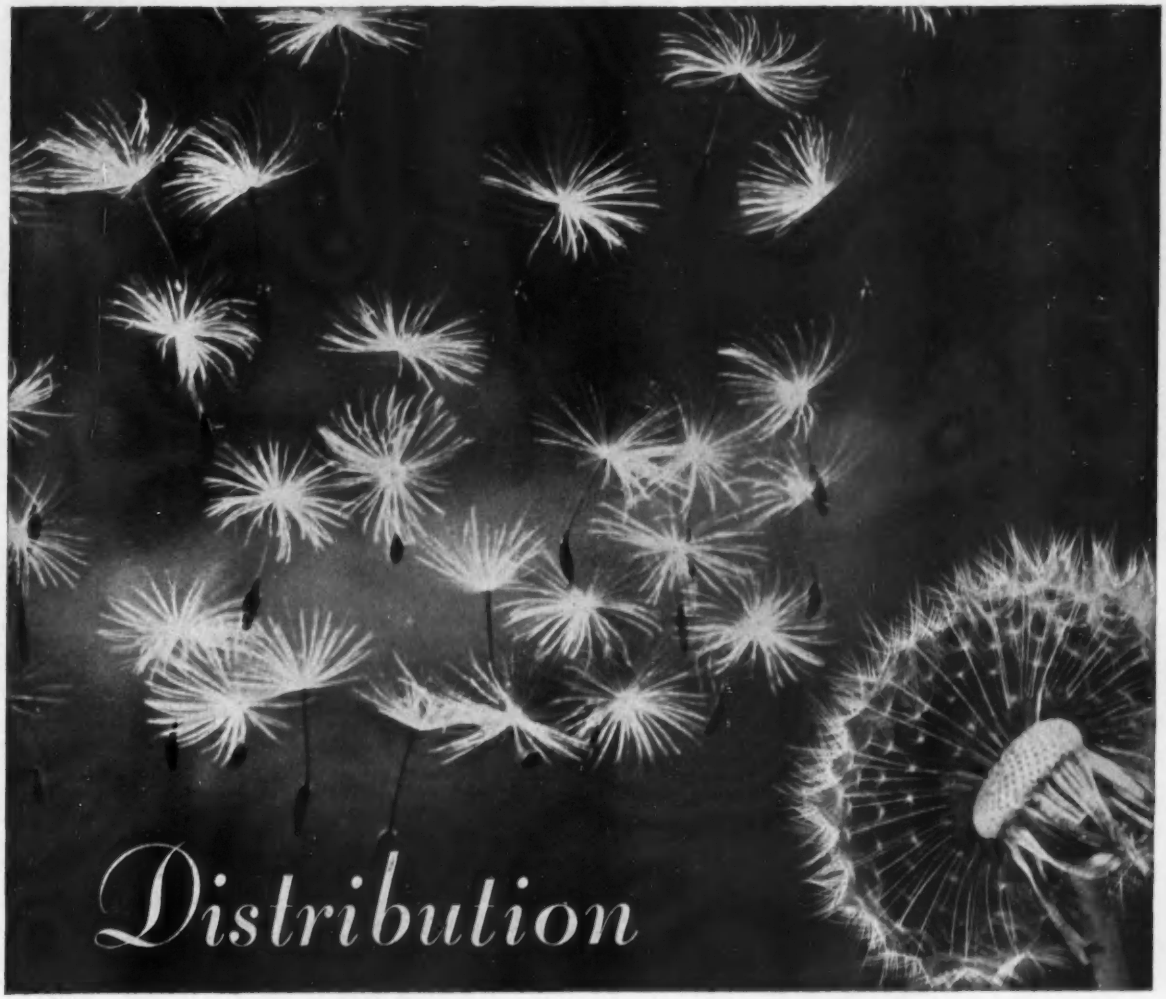
Our production of television receivers has been running at a very high level and in May last we made our half-millionth set.

Arrangements have been completed with Sylvania Electric Products Inc. to form a joint company for the manufacture of television picture tubes in this country.

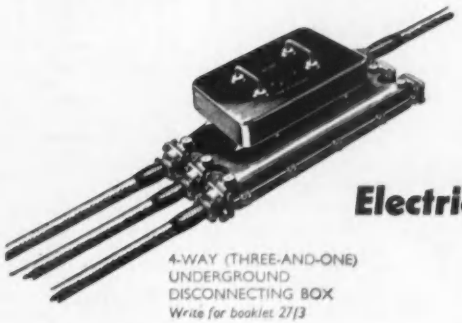
It is as yet too early to say very much about "Sylvania-Thorn Colour Television Laboratories Ltd.," which was formed last year by Sylvania Electric Products Inc. of New York and ourselves.

Our Export Division has shown the largest turnover on record and in the field of fluorescent tubes your Company has been responsible for more than 70% of the total exports from this country.

Your Company has brought into this country from the United States alone more than 1,800,000 dollars during the year under review. We are making a constantly growing contribution and in some of our products we have built up Britain's position more than any other company in this country. The report was adopted.



The dandelion's ingenious parachute is one of nature's best ideas for distributing seeds. In distributing electricity the engineer has a different problem. This time the ingenuity is man-made, and no firm has contributed more towards the technique than HENLEY.

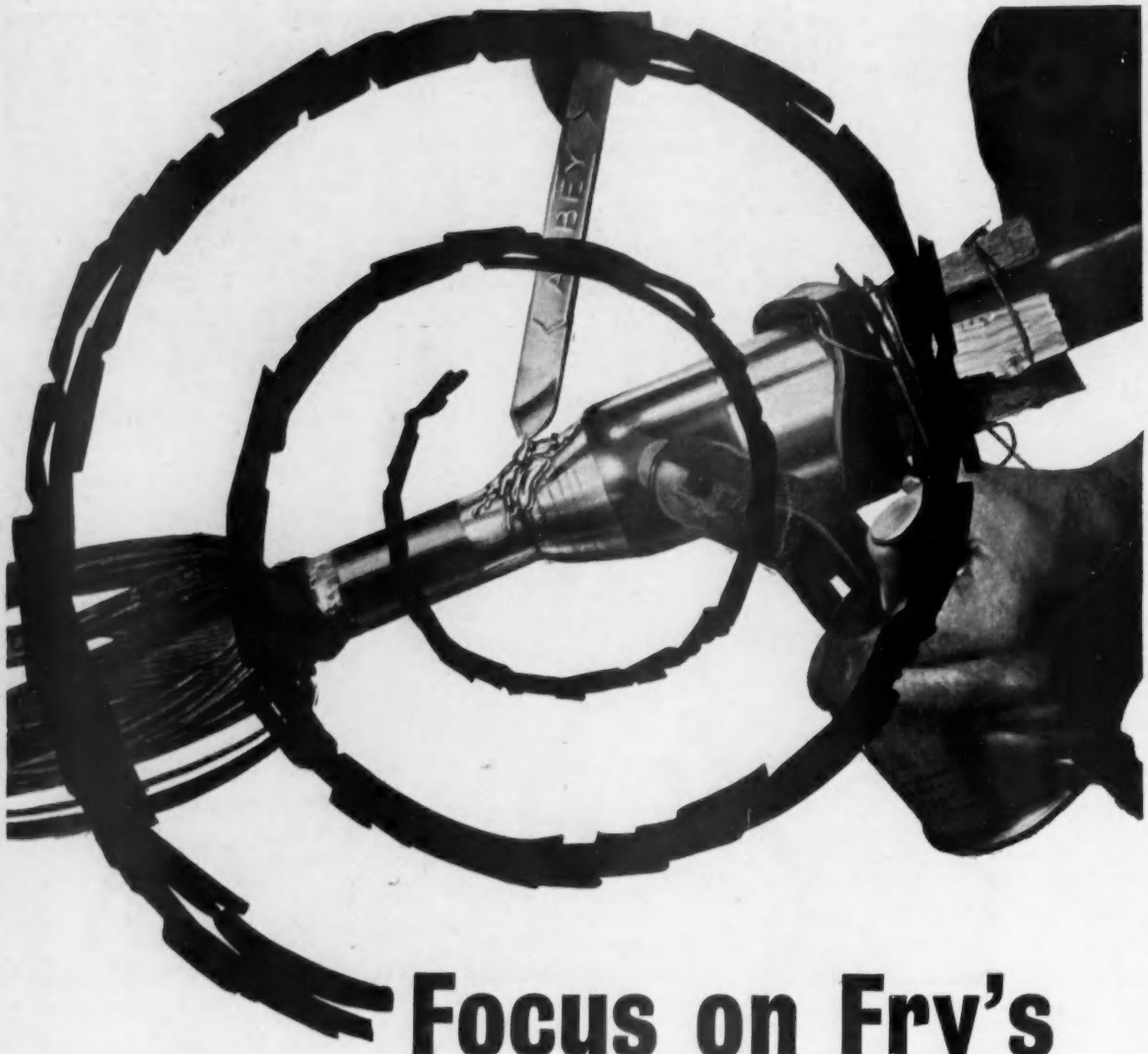


4-WAY (THREE-AND-ONE) UNDERGROUND DISCONNECTING BOX
Write for booklet 27/3

Electrical Distribution Equipment

by HENLEY

W. T. HENLEY'S TELEGRAPH WORKS CO. LTD., 51-53 HATTON GARDEN, LONDON, E.C.1



Focus on Fry's

This picture of a jointing operation on a 0.25 sq. in. 11 kV cable, shows a typical application of Fry's ABBEY plumbers solder.

Quickly reaching its "buttery" consistency, the tin-rich composition of ABBEY solder guarantees rapid cooling, close graining and complete freedom from pinholes.

Please write for full details of the FRY'S *range of solder products.*

FRY'S Metal Foundries Limited

Tandem Works, Merton Abbey, London, S.W.19. Tel: MITcham 4023

and at MANCHESTER · GLASGOW · BRISTOL & DUBLIN

70

CLASSIFIED ADVERTISEMENTS

Advertisements should be sent to the Classified Advertisement Dept., Electrical Times, Sardinia House, Sardinia Street, London, W.C.2, before 10 a.m. on TUESDAY of the week of issue. Official Displayed Advertisements are charged at 32s. 6d. per inch, and all other classified advertisements at 2s. 6d. per line. Situations Wanted four insertions at twice the single insertion rate. Fee for Box Number and postage on replies 2s.

TENDERS INVITED

COUNTY BOROUGH OF DERBY

TRUNK ROAD LIGHTING ON A.6, DUFFIELD ROAD

TENDERS are invited for the supply of 33 Group A Sodium lighting units.

Tender documents may be obtained from the Borough Engineer and Surveyor, Council House, Corporation St, Derby.

Tenders, with completed Bill of Quantities, to be returned in a plain sealed envelope, endorsed "A.6 Street Lighting," to the undersigned not later than first post on Tuesday, 27 Sept., 1955.

G. H. EMLYN JONES,
Town Clerk.
Council House,
Corporation St, Derby. (V 153)

APPOINTMENTS VACANT

Engagement of persons must be made through a Local Labour Office or Scheduled Employment Agency, if the applicant is a man aged 18-64, or a woman aged 18-59; unless the person concerned is excepted or the employment is in a managerial or professional capacity, or is otherwise excepted from the provisions of the Notification of Vacancies Order, 1952.

YORKSHIRE ELECTRICITY BOARD

No. 5 (Wakefield) Sub-Area

SECOND ASSISTANT ENGINEER (OPERATION AND MAINTENANCE)

CANDIDATES must have had a good general and technical education and should be Corporate Members of the I.E.E. or hold equivalent qualifications.

They should have had experience of all branches of distribution work on overhead and underground systems, and experience on 33 and 66 kV systems will be an advantage.

Salary N.J.B. Class K Grade 7 £975/£25/£1,050 per annum.

Applications giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 5 (Wakefield) Sub-Area, Yorkshire Electricity Board, 1a Denby Dale Rd, Wakefield, not later than 22 Sept., 1955.

No. 1 (Bradford) Sub-Area

FOURTH ASSISTANT ENGINEER (METERS, TESTING AND PROTECTION)

Candidates should hold the Higher National Certificate in Electrical Engineering or an equivalent technical qualification. They should have some experience in the commissioning of new substations and in routine testing and maintenance of protective gear. This post may involve a measure of standby availability.

Salary—N.J.B. Class K, Grade 13, £675/£15/£720 per annum.

Applications giving full details of age, qualifications and experience, together with the names of two referees, should be forwarded to the Manager, No. 1 (Bradford) Sub-Area, Yorkshire Electricity Board, 45-53 Sunbridge Rd, Bradford, not later than 22 Sept., 1955. (V 132)

SOUTH OF SCOTLAND ELECTRICITY BOARD

Lothians Area

APPLICATIONS are invited for the following superannuable appointments. Conditions of service in accordance with the N.J.B. Agreement, Schedule A.

1. SENIOR ASSISTANT ENGINEER (Construction) at Area Headquarters, Musselburgh. Salary Scale £975/£1,050 per annum (N.J.B. G.4).

Applicants should have had experience in handling labour and in overhead line erection, cable laying and indoor and outdoor substation construction on 11 kV and 33 kV systems, and should possess qualifications leading to Corporate Membership of the Institution of Electrical Engineers.

2. SECOND ASSISTANT ENGINEER (Meters, Test and Protection) at Area Headquarters, Musselburgh. Salary Scale £790/£850 per annum (N.J.B. G.7).

Applicants should have had experience in the testing and commissioning of electrical plant, on H.V. underground cable fault location and in protective gear and metering practice, and should possess qualifications leading to Corporate Membership of the Institution of Electrical Engineers.

3. THIRD ASSISTANT ENGINEER (Planning and Development) at Area Headquarters, Musselburgh. Salary Scale £675/£720 per annum (N.J.B. G.10).

Applicants should have had experience in planning extensions to rural and urban networks up to 33 kV. Previous construction experience and possession of a Higher National Certificate or equivalent qualification would be an advantage.

Application forms, which may be obtained from the undersigned, should be lodged within fourteen days of the date of this advertisement.

G. F. MOORE,
Manager.
12 High St,
Musselburgh. (V 118)

CENTRAL ELECTRICITY AUTHORITY

Yorkshire Division

APPLICATIONS are invited for the appointment of SENIOR ASSISTANT ENGINEER in the Technical Department, Divisional Headquarters, Leeds.

Commencing salary within the range £1,100/£1,225 per annum, Grade 1, Class AX, National Joint Board Agreement (Schedule C), according to qualifications and experience rising ultimately to a maximum of £1,345 per annum (Class EX).

Applicants should be Corporate Members of the Institution of Electrical Engineers or hold equivalent qualifications, and must be fully experienced in the testing and commissioning of electrical equipment on high voltage transmission systems and in generating stations, in fault investigations on similar equipment and in the testing, commissioning and maintenance of associated protective and control equipment.

Works experience will be an advantage.

Application forms obtainable from Divisional Secretary (Establishments), Central Electricity House, St. Mary's Rd, Leeds 7, should be returned within 14 days of the appearance of this advertisement.

G. A. VOWLES,
Divisional Controller.
(V 160)

THE EAST MIDLANDS ELECTRICITY BOARD

Lincolnshire Sub-Area

ENGINEERING DRAUGHTSMAN

APPLICATIONS are invited for the position of Engineering Draughtsman in the Drawing Office at the Lincolnshire Sub-Area Headquarters.

Candidates should have a good general and technical education, together with experience in Plant layout for Outdoor and Indoor Substations, particularly 33 kV; Network and Circuit diagrams; Sag-Tension calculations and Mains Records.

In the absence of the Senior Draughtsman the successful candidate will be required to take charge of a small Drawing Office.

The commencing salary will be in accordance with Grade 6, Schedule D, £510/£630 per annum of the salary scale of the National Joint Board according to experience and qualifications.

Applications giving full particulars of age, present position, qualifications and experience, should be submitted to the Manager, Lincolnshire Sub-Area, North House, Grantham, within 14 days of this advertisement. (V 124)

CENTRAL ELECTRICITY AUTHORITY

South Eastern Division

BRIGHTON "A" AND "B" POWER STATIONS

GENERAL ASSISTANT ENGINEER (CHEMIST). Applicants should possess O.N.C. (Chemistry) or equivalent qualifications and possess a sound knowledge of elementary chemistry. Class L, Grade 19, £475/£520 per annum.

TECHNICAL DEPARTMENT, DIVISIONAL HEADQUARTERS

GENERAL ASSISTANT ENGINEER required to assist the System Development Engineer in the preparation of schemes of reinforcement to the main electrical connections, the calculation of fault levels, load flows, etc. H.N.C. in Electrical Engineering an advantage. Class AX/DX, Grade 7, £475/£550/£610 per annum plus London Allowance. N.J.B. Conditions of Service.

LITTLEBROOK POWER STATION

ASSISTANT SHIFT CHARGE ENGINEER—Applicants should possess technical qualifications equivalent to Graduate membership of either the Institution of Mechanical or Electrical Engineers. Experience in the efficient operation of modern high pressure power station plant with P.F. firing and experience in administration and control of labour essential. Assistance with housing may be possible for those living at present in rented property. Class L, Grade 9, £900/£975 per annum plus London Allowance. Applications, giving details of education, present position, experience, etc., should be sent, according to location of vacancy, to the following: Station Superintendent, Brighton Power Station, Portslade-by-Sea, Sussex. Establishment Officer, Central Electricity House, Lower Ham Rd, Kingston-on-Thames. Station Superintendent, Littlebrook Power Station, Near Dartford, Kent.

Closing date for receipt of applications, 21 Sept. (V 159)

SOUTH OF SCOTLAND ELECTRICITY BOARD

APPLICATIONS are invited for the post of ASSISTANT ENGINEER in the Transmission Section of the Chief Engineer's Department at Glasgow.

Applicants should have the minimum qualification of a Higher National Certificate in Electrical Engineering and also experience in the Electricity Supply Industry and/or with a firm of electrical manufacturers.

Salary will be in accordance with N.J.B. Schedule C, Class AX/DX, Grade 6, £600/£785 per annum.

The position is superannuable. Application should be made on the standard application form, which may be obtained from the undersigned, and returned not later than 23 Sept., 1955.

J. MEEK,
Secretary.
P.O. Box 173,
351 Sauchiehall St,
Glasgow C.2.
1 Sept., 1955. (V 146)

CITY OF SALISBURY, SOUTHERN RHODESIA
Electricity Department
VACANCY FOR ASSISTANT INSTALLATION ENGINEER

APPLICATIONS are invited for the post of Assistant Installation Engineer (Professional Officer Grade 4) on the salary scale £1,250 x £50—£1,450 p.a.

Candidates should have had a good general and technical education, and must be associate members of the Institution of Electrical Engineers.

The successful applicant will require to have a thorough knowledge of the layout and design of large electrical installations, commercial electrical development, tariffs and estimates. He must be able to advise all types of electricity consumers, and have sound practical experience of industrial installations.

The appointment will be subject to City Council's Service and Leave Regulations, and the successful candidate will be required to furnish a satisfactory medical certificate. No allowances are payable, and entry will be at the minimum of the salary scale.

The successful candidate must be able to comply with the requirements of the Immigration Authorities.

Applicants are requested to submit full particulars of their qualifications, training and experience, giving particulars of positions held and salaries received, marital state, age, place of birth, and nationality. Copies of not more than three recent testimonials may be included.

Canvassing directly or indirectly will be a disqualification.

Applications, suitably endorsed on the cover, must reach the offices of the undersigned on or before Saturday, 17 Sept., 1955. Airmail paper should be used.

DAVIS AND SOPER LTD.,
Agents to the City Council of Salisbury, Southern Rhodesia.
52 and 54, St. Mary Axe,
London, E.C.3.
23 Aug., 1955. (V 65)

SENIOR EXPERIMENTAL OFFICER

required by the Atomic Weapons Research Establishment, Aldermaston, Berks. To carry out research into the production of high energy discharges of short duration by the use of surge generators. Minimum qualifications is Higher School Certificate (Science) or equivalent, but a Pass Degree is desirable. Candidates should have some years' experience in the design and operation of very high current surge generators. They should be well versed in the technique required to measure high voltage and high current transients in the operation of optical and electronic instruments in the vicinity of surge generators.

Salary: £1,090 per annum to £1,285 per annum (male). Contributory Superannuation scheme. Successful married officers now living outside the Establishment's transport area will be eligible for housing on one of the Authority's estates.

Requests for application forms by postcard to the Senior Recruitment Officer at the above address. Quote reference 721/49. (V 109)

CENTRAL ELECTRICITY AUTHORITY
Southern Division

APPLICATIONS are invited for the following position:

SHIFT CONTROL ENGINEER
COWES GENERATING STATION,
ISLE OF WIGHT
S/13. 672

Candidates should have had appropriate previous experience in a modern generating station, and manufacturing works experience will be an advantage. Applicants should have at least H.N.C. and preferably possess or be studying for qualifications leading to corporate membership of a recognised professional institution.

Salary N.J.B. Grade E/10, £595/£640.

Special application forms, obtainable from P. D. A. Oliver, Divisional Secretary, 111 High St, Portsmouth, should be returned by 21 Sept. Please quote reference E.T. (V 162)

COLLEGE OF TECHNOLOGY, BIRMINGHAM
Department of Electrical Engineering

APPLICATIONS are invited for the following posts:

(*a*) ASSISTANT, GRADE B

The person appointed will be required to take up duty as soon as possible. Applicants should hold a degree in Electrical Engineering or its equivalent and should have had practical experience in an Electrical Engineering capacity.

Salary will be in accordance with the Burnham (Further Education) Scale for Grade B Assistants (Men) £525 x £25 (Final increment £20)—£820, (Women) £475 x £20—£655 (plus equal pay increment) with additional graduate and training allowances where applicable. In fixing the commencing salary, account will be taken of teaching and industrial experience.

(*b*) RESEARCH ASSISTANT

Candidates must have a good honours degree in Electrical Engineering, and preferably should be graduates of a University which awards higher degrees for external study.

Salary will be in accordance with the Burnham (Further Education) Scale for Grade A Assistants. Basic salary (Men) £510 with increments for approved training and industrial or teaching experience.

Further particulars and form of application may be obtained from the Registrar, College of Technology, Suffolk St, Birmingham 1, on receipt of stamped addressed foolscap envelope. Completed forms should be returned to him not later than two weeks after the insertion of the advertisement.

K. R. PILLING,
Clerk to the Governing Body.
(V 123)

CENTRAL ELECTRICITY AUTHORITY
South Western Division
TECHNICAL STAFF VACANCIES

(*a*) GENERAL ASSISTANT ENGINEERS—Portishead "B" Power station, N.J.B. Class "J," Grade 15, £555/£600. (Ultimate classification "K".) (*b*) STATION CHEMIST—Newton Abbot Power station, N.J.B. Class "F," Grade 7, £755/£800.

Superannuation.

For (*a*) Preference given to candidates who hold or are at present studying for Higher National Certificate or similar qualification.

Closing date 17 Sept., 1955.

For (*b*) Candidates should possess H.N.C. in Chemistry or equivalent, and have experience in the testing and analysis of fuels, oil, and the control of boiler water conditions.

Closing date 24 Sept., 1955.

Applications on Form A.E.6/ACT, obtainable from and returnable to R. C. Barrett, Divisional Secretary, 26 Oakfield Rd, Bristol, 8. (V 133)

ESSEX
Mid-Essex Technical College and School of Art
MARKET ROAD, CHELMSFORD

REQUIRED in Jan., 1956, for Engineering Department:

LECTURER in TELECOMMUNICATIONS to be responsible for courses up to H.N.C. standard. Honours Degree and/or Corporate Membership of I.E.E. with teaching and industrial experience.

Additional Posts created by expansion of the Department:

LECTURER in ELECTRICAL ENGINEERING for Electrical Measurements and industrial Electronic Control Systems. Honours Degree or Corporate Membership of I.E.E. with teaching and industrial experience required.

ASSISTANT GRADE B (Mechanical or Electrical Engineer) to teach Engineering Mathematics with some engineering subjects in addition. Teaching and/or industrial experience and graduate qualification required.

Salaries according to Burnham Further Education Report.

Details and forms (stamped addressed foolscap envelope) from Clerk to Governors. (V 130)

CENTRAL ELECTRICITY AUTHORITY
Eastern Division

APPLICATIONS are invited for the following posts:

GENERAL ASSISTANT ENGINEER
LETCHWORTH GENERATING STATION

Salary Class E, Grade 13, £475 x £15—£520 per annum.

Duties will include assistance in the operation and testing of Station plant, particularly the testing and control of process water and the servicing and adjustment of instruments and automatic controls and provide a suitable basis for promotion to higher technical grades.

The candidate should have had training or experience in similar types of work. Manual Workers in skilled grades with suitable technical training will be considered. Previous experience in a Generating Station and/or technical training to the standard of the Ordinary National Certificate or its equivalent will be of advantage.

GENERAL ASSISTANT ENGINEER
NORWICH GENERATING STATION

Salary Class F, Grade 14, £475 x £15—£520 per annum.

The duties of the successful applicant will include assisting in the Control Room on shift and other operation and investigation duties. Preference will be given to applicants who have had previous experience in a Generating Station and who have reached the standard of the Ordinary National Certificate in Electrical Engineering or its equivalent.

Applications stating age, qualifications and experience should be sent to the Controller, Central Electricity Authority, Eastern Division, Northmet Hse, Southgate, N.14, by 17 Sept., 1955.

W. N. C. CLINCH,
Controller.
(V 136)

LONDON ELECTRICITY BOARD
SENIOR AND ENGINEERING DRAUGHTSMEN

APPLICATIONS are invited for the following vacancies. These posts are permanent and superannuable and they are graded under Schedule D of the National Joint Board agreement.

ENGINEERING DRAUGHTSMEN

Commencing salaries dependent upon qualifications and experience within Grade 6, £535, 10s./£661, 10s. per annum, inclusive of London Allowance.

Chief Engineer's Department
(AT STAMFORD ST., S.E.1)
Vacancy No. V/1989/T

Candidates should be experienced in surveying E.H.V. cable routes and have had good experience in making accurate surveys of cable routes during the laying of E.H.V. cables, taking information and sketches on site and producing final drawings.

Chief Engineer's Department
(AT STAMFORD ST., S.E.1)
Vacancy No. V/1989/T

Applicants, required for plant layout, should preferably have served an engineering apprenticeship and have had technical training to Ordinary National Certificate level, together with experience in the layout of transforming plant, H.V. switchgear and cables up to 66 kV. (In this instance an appointment may be made within Grade 5, £672/£777 per annum inclusive.)

SENIOR DRAUGHTSMEN

Commencing salaries dependent upon qualifications and experience within Grade 5, £672/£777 per annum, inclusive of London Allowance.

Contracting Section
(AT STRATFORD PLACE, W.1)
Vacancy No. V/1986/T

Applicants should be capable of completing layouts of plant and associated cabling for large industrial installations.

Application forms for the foregoing vacancies are obtainable from the Personnel Officer, 46/7 New Broad St, London, E.C.2. Please enclose addressed envelope and quote reference No. of vacancy preferred. (V 35)

CENTRAL ELECTRICITY AUTHORITY

East Midlands Division

APPLICATIONS are invited for the following positions within the Division:

SECOND ASSISTANT ENGINEER (CIVIL)
GENERATION (CONSTRUCTION) DEPARTMENT

Vacancy No. 146/55/ET

Preference will be given to applicants who have a degree in Civil Engineering, are Corporate Members of the Institution of Civil Engineers or possess equivalent qualifications.

They should have had experience in the design and construction of heavy foundations, river works, structures in reinforced concrete and steel, and other civil engineering works associated with the design and construction of Power Stations.

Experience in the preparation of specifications, bills of quantities and estimates will be a recommendation.

Salary will be within Schedule C, Class AX/DX, Grade 2 (£950/£1,165 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 20 Sept., 1955.

MAINTENANCE ENGINEER (ELECTRICAL)
LINCOLN POWER STATION

Vacancy No. 147/55/ET

Applicants should have received a thorough technical and practical training followed by considerable experience in testing protective gear, maintenance of alternators, transformers, switchgear and associated equipment and be capable of taking control of the electrical maintenance staff.

Preference will be given to candidates who are Associated Members of a recognised Institute or possess similar qualifications.

Salary will be within Class E, Grade 6 (£755 x £15—£800 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 27 Sept., 1955.

ASSISTANT SHIFT CHARGE ENGINEER
NORTHAMPTON POWER STATION

Vacancy No. 149/55/ET

Applicants should have had sound technical training and be experienced in the operation of modern steam power stations. They should preferably hold the higher National Certificate in Electrical or Mechanical Engineering.

Salary will be within Class G, Grade 9 (£715 x £15—£760 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 27 Sept., 1955.

ASSISTANT SHIFT CHARGE ENGINEER
STAYTHORPE POWER STATION

Vacancy No. 148/55/ET

Applicants should possess the Higher National Certificate or its equivalent and have had experience in a responsible position in a modern Generating Station.

Salary will be within Class J, Grade 9 (£790 x £20—£850 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 27 Sept., 1955.

MAINTENANCE ENGINEER (ELECTRICAL)
LONGFORD POWER STATION, COVENTRY

Vacancy No. 150/55/ET

Applicants should have received a thorough technical and practical training followed by considerable experience in testing protective gear, maintenance of alternators, transformers, switchgear and associated equipment and be capable of taking control of the electrical maintenance staff.

Preference will be given to candidates who are Associated Members of a recognised Institute or possess similar qualifications.

Salary will be in accordance with Class G, Grade 6 (£840/£900 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 27 Sept., 1955.

ASSISTANT SHIFT CHARGE ENGINEER
DRAKELOW POWER STATION

Vacancy No. 151/55/ET

Applicants must have technical qualifications up to Higher National Certificate Standard and have received a sound engineering training followed by operating experience with large capacity High Pressure

continued in next column

continued from previous column

Plant, preferably in conjunction with P.F. Boilers.

Salary will be within Class J, Grade 9 (£790 x £20—£850 per annum) of the National Joint Board Agreement.

Closing date for receipt of applications, 27 Sept., 1955.

These appointments will be pensionable within the terms and provisions of the Central Electricity Authority and Area Boards Superannuation Scheme.

Applications should be submitted on the official form A.E.6/ACT which may be obtained from the Divisional Establishments Officer, Central Electricity Authority, P.O. Box 25, Barker Gate, Nottingham, and should be returned to the undersigned by the date stated. Please quote Vacancy Number.

L. F. JEFFREY,
Divisional Controller.

2 Sept., 1955. (V 145)

SOUTH EASTERN ELECTRICITY BOARD

DISTRICT COMMERCIAL ENGINEER
Central Sussex District

SALARY £840 x £20—£900 per annum under N.J.B. Class E, Grade 4. Superannuable. Applicants should be suitably qualified and have had wide experience in the administration of a Commercial Department and possess a sound knowledge of tariffs, showrooms, contracting, sales promotion and urban and rural development. The successful candidate may elect to have a service tenancy of a Board's flat.

Applications, naming two referees, to Arthur Barnes, M.I.E.E., Central Sussex District Manager, SEEBoard, Electra House, Church Rd, Haywards Heath, by 21 Sept., 1955.

GENERAL ASSISTANT ENGINEER
Woking District

Salary £555 x £15—£600 per annum under N.J.B. Class E, Grade 11. Superannuable. Applicants should preferably hold the Higher National Certificate in Electrical Engineering, or its equivalent, and have had practical experience in general distribution work on systems up to 11 kV.

Applications, naming two referees, on forms from E. Peel, A.M.I.E.E., Woking Manager, SEEBoard, 4 Chobham Rd, Woking by 21 Sept., 1955.

SENIOR DEMONSTRATOR/SHOWROOM ASSISTANT

(Female—Woking District)

Salary £525 x £20—£585 per annum under N.J.C. Agreement, Grade 2. Superannuable.

Applicants should have showroom experience and be capable of demonstrating electrical appliances both in showrooms and on consumers' premises. Duties will include the supervision of demonstrators and responsibility for demonstrations.

Applications, naming two referees, on forms from E. Peel, A.M.I.E.E., Woking Manager, SEEBoard, 4 Chobham Rd, Woking by 21 Sept., 1955.

ELECTRICIAN
Central Sussex District

Wages 4s. 1d. per hour for a 44-hour, 5-day week under N.J.I.C. Agreement. Applicants should have wide experience of all types of electrical installation work.

Applications, naming two referees, to Arthur Barnes, M.I.E.E., Central Sussex District Manager, SEEBoard, Electra House, Church Rd, Haywards Heath, by 21 Sept., 1955.

A. L. HOWELL,
Secretary.
(V 144)

LONDON COUNTY COUNCIL

PADDINGTON Technical College, ASSISTANT GRADE B to teach Electrical Engineering subjects to Ordinary National Certificate level and subjects of the C. and G. Electrical Installation, Courses B and C, and be responsible for the Electrical Laboratories of the Engineering Department. Burnham F.E. salary scale £561 x £25—£982, individual minimum and maximum according to age, qualifications and experience. Application forms from Secretary at College, Saltram Crescent, W.9, returnable by 24 Sept. (1358.) (V 107)

THE NORTH WESTERN ELECTRICITY BOARD

FOURTH ASSISTANT DISTRICT ENGINEER, BURY DISTRICT

THE successful applicant will be required to have some knowledge of construction work on overhead lines, underground cables and substations up to and including 11,000 V, together with some experience of the operation and maintenance of supply networks. Preference given to applicants who hold the H.N.C. in Electrical Engineering.

Salary scale: £595 x £15—£640 per annum. Grade F.11. N.J.B. Conditions.

Applications to Sub-Area Manager, No. 2 Sub-Area, The North Western Electricity Board, 2 St. George's Rd, Bolton, by 17 Sept., 1955.

THIRD ASSISTANT ENGINEER (SYSTEM PLANNING AND DESIGN), SUB-AREA ENGINEER'S DEPARTMENT, BLACKBURN

Applicants should have had a sound training in Electrical Engineering and should hold the H.N.C. in Electrical Engineering or equivalent qualifications.

The duties of the post will include the preparation of schemes and estimates for high and low voltage networks, and system calculations. Practical experience on the construction and operation of high and low voltage systems will be an advantage.

Salary scale: £790 x £20—£850 per annum. Grade K.10. N.J.B. Conditions.

Applications to Sub-Area Manager, No. 5 Sub-Area, The North Western Electricity Board, Jubilee St, Blackburn, by 17 Sept., 1955.

GENERAL ASSISTANT ENGINEER (METERS) SUB-AREA ENGINEER'S DEPARTMENT (BARROW TESTING STATION)

The successful applicant will be required to assist in general testing duties in a Class "A" Polyphase Testing Station.

Applicants should possess the H.N.C. in Electrical Engineering, but consideration will be given to applicants in possession of the O.N.C. who are progressing towards obtaining their H.N.C.

Salary scale: £475 x £15—£520 per annum. Grade J.17. N.J.B. Conditions.

Applications to Sub-Area Manager, No. 6 Sub-Area, The North Western Electricity Board, Castle Green, Kendal, by 17 Sept., 1955. (V 148)

LONDON ELECTRICITY BOARD

GENERAL ASSISTANT ENGINEER

APPLICATIONS are invited for the above position in the Hackney/Stoke Newington or Stepney/Bethnal Green Districts of the Northern Sub-Area.

Applicants should have had a sound technical education up to at least National Certificate Standard, with practical experience in general mains work, including installation and maintenance of distribution systems, with the preparation and keeping of associated records.

Pending determination as to the grading and salary applicable to the post within the National Joint Board agreement, the provisional minimum salary will be £500 per annum inclusive of London Allowance.

Application forms obtainable from Personnel Officer, 46/47 New Broad St, London, E.C.2, to be returned completed by 29 Sept., 1955. Please enclose addressed envelope and quote ref: V/2004/5/T.

(V 164)

CENTRAL ELECTRICITY AUTHORITY

Midlands Division

POWER STATION SUPERINTENDENT is required for Hams Hall "A" Power Station. Superannuable appointment, salary in accordance with N.J.M. Scale 2, £1,400/£1,550.

Candidate should have a wide experience in the operation of a large modern generating station, and should possess sound administrative ability. The possession of a University degree in engineering or corporate membership of the Institution of Electrical and/or Mechanical Engineers will be an advantage.

Apply, quoting Vacancy No. 48MD on form AE6, available from the Establishments Officer, 53 Wake Green Rd, Moseley, Birmingham 13, by 24 Sept., 1955. (V 134)

CENTRAL ELECTRICITY AUTHORITY
South Wales Division

Vacancy No. 95/55

APPLICATIONS are invited for superannuable N.J.B. appointments in the Drawing Office, Construction Department, Divisional Headquarters.

(*a*) SENIOR DRAUGHTSMAN (Electrical)
Salary: Schedule D, Grade 5, £640/£740 per annum.

(*b*) ENGINEERING DRAUGHTSMAN (Electrical)

(*c*) ENGINEERING DRAUGHTSMAN (Mechanical)
Salary: Schedule D, Grade 6, £510/£630 per annum.

Candidates should be suitably trained, possess an Ordinary or Higher National Certificate and be experienced in one or more classes of plant or equipment usually installed in Power Stations.

Application forms obtainable from Secretary, South Wales Division, Central Electricity Authority, Twyn-y-Fedwen Rd, Gabalfa, Cardiff, to be returned by 23 Sept., 1955. (V 143)

MIDLANDS ELECTRICITY BOARD

APPLICATIONS are invited for the following superannuable posts.

Central Gloucestershire Sub-Area
SENIOR ASSISTANT (WAYLEAVES)

Duties include supervision of Sub-Area Wayleave Department, negotiation relating to purchase of land and property, planning consents, and wayleaves, survey and plotting of routes for mains, arranging timber felling and valuation thereof, assessment of compensation for damage to crops and property, and rentals records. Technical qualifications desirable. Salary £720/£795 per annum. (N.J.C. Grade 5).

Apply in writing within fourteen days, stating age, experience, present salary and position, to Mr S. Raybould, Sub-Area Manager, Midlands Electricity Board, 126 London Rd, Gloucester.

South Staffs and North Worcs. Sub-Area
SECOND ASSISTANT DISTRICT COMMERCIAL ENGINEER (DUDLEY DISTRICT)

Applicants should have had a sound technical training with wide practical experience in the sale and installation of domestic and commercial electrical equipment and the work associated therewith. The successful applicant will be required to assist in all branches of Commercial Work including advising consumers on domestic, commercial and industrial equipment, estimating, and contracting work. Technical qualifications desirable. Salary £715/£760 per annum. (N.J.B. Grade F.8).

Apply in writing within fourteen days stating age, qualifications, experience, present position and salary to Mr T. G. Keeler, Sub-Area Manager, Midlands Electricity Board, P.O. Box No. 9, Toll End Rd, Tipton.

Worcester and District Sub-Area
ENGINEERING DRAUGHTSMAN/SURVEYOR (STRATFORD-ON-AVON)

Applicants should be conversant with, and proficient in, the preparation of engineering drawings, maps and plans in connection with mains distribution systems. Experience in the Electricity Supply Industry will be an advantage. Salary £510/£630 per annum. (N.J.B. Schedule "D" Grade 6).

Apply in writing within fourteen days stating age, qualifications, present salary and position, to Mr R. Mallet, Sub-Area Manager, Midlands Electricity Board, Whittington, Worcester.

Birmingham and District Sub-Area
DEMONSTRATORS (FEMALE)

Applicants must have had a good education and should have a certificate of a recognised Domestic Training College and/or the E.A.W. Certificate. Duties include lecture demonstrations and advising consumers on the selection and use of electrical appliances. Salary £425/£525 per annum. (N.J.C. Grade 1).

Apply in writing within fourteen days stating age, education, qualifications and experience, to Emil Braathen, Sub-Area Manager, Midlands Electricity Board, 14 Dale End, Birmingham 4.

A. STEPHENS,
Secretary.
(V 158)

SOUTH OF SCOTLAND ELECTRICITY BOARD
Lanarkshire Area
DISTRICT COMMERCIAL STAFF—INSTALLATION ENGINEERS

APPLICATIONS are invited for appointments of Installation Engineer in each of Coatbridge, Motherwell and Uddingston Districts of Lanarkshire Area.

The positions are superannuable and the salary in each case will be in accordance with National Joint Board, Class F, Grade 9 (£675/£720 per annum).

Applicants should have had a sound engineering and technical training with experience of consumers' service, including installation, testing, metering, maintenance and repairs.

Forms of application, which may be had from the undersigned, should be forwarded to this office not later than 22 Sept., 1955.

DUGALD SMITH,
Manager.
137 Almada St, Hamilton. (V 142)

CENTRAL ELECTRICITY AUTHORITY
North West, Merseyside and N. Wales Division

VACANCY NO. E.226/315/T. SHIFT CONTROL ENGINEER at Chadderton "B" Generating Station. Salary £675/£720 (G.10).

Vacancy No. E.226/316/T. ASSISTANT MAINTENANCE ENGINEER (Mech.), at Bromborough Generating Station. Salary £790/£850 (H.8).

Applications to Divisional Secretary, Central Electricity House, 825 Wilmslow Rd, Manchester 20, before 17 Sept. Quote vacancy No. (V 151)

EASTERN ELECTRICITY BOARD
Essex Sub-Area
FOURTH ASSISTANT ENGINEER SOUTHEND DISTRICT

CANDIDATES should have had a sound technical training and experience in the construction, operation and maintenance of H.V. and L.V. distribution systems including substations.

Salary—N.J.B. Class F, Grade 11 (£595/£640).

The successful candidate will be required to contribute to a superannuation scheme and may be required to undergo a medical examination.

Apply, by letter, within 14 days to the District Manager, Eastern Electricity Board, 85 London Rd, Southend-on-Sea, Essex. (V 161)

CENTRAL ELECTRICITY AUTHORITY
North West, Merseyside & N. Wales Division

VACANCY No. E.223/310/T. FOURTH ASSISTANT ENGINEER, Electrical Section, Generation Construction Department, Liverpool. Salary £600/£805 (AX/EX/6). H.N.C. (Elec.), and experience in design and installation of power station electrical equipment is desirable.

Applications to Divisional Secretary, Central Electricity House, 825 Wilmslow Rd, Manchester 20, before 17 Sept. Quote Vacancy No. (V 108)

SOUTH WESTERN ELECTRICITY BOARD
THIRD ASSISTANT DISTRICT ENGINEER (OPERATION AND MAINTENANCE)—EXE VALLEY (TIVERTON)

SALARY N.J.B. Class C, Grade 9, £555/£600 per annum.

The successful candidate will be responsible for duties in connection with operation and maintenance of E.H.T. and L.V. mains and plant.

Applicants must have had sound practical experience in the operation and maintenance of 33 kV, 11 kV and L.V. underground and overhead networks, substation plant and ancillary equipment. Possession of a current driving licence is required.

The candidate appointed should be prepared to reside in the Tiverton district and undertake standby duties.

Application forms obtainable from the District Manager, 28 Fore St, Tiverton, are to be returned by 20 Sept., 1955. (V 147)

CENTRAL ELECTRICITY AUTHORITY
Midlands Division

STATION SHIFT CONTROL ENGINEER is required at Nechells "B" Power Station, Birmingham. N.J.B. service conditions, superannuable appointment, salary within Schedule A of the Agreement, Grade J10, £755/£800 per annum.

A sound technical training and practical experience in the control of steam generating plant and main switchgear are required. Appropriate technical qualifications an advantage.

Apply quoting Vacancy No. 54MD on form A.E.6, available from the Establishments Officer, 53 Wake Green Rd, Moseley, Birmingham 13, by 24 Sept., 1955. (V 150)

MECHANICAL AND ELECTRICAL ENGINEERS
In Various Government Departments

THE Civil Service Commissioners invite applications for pensionable posts in a wide variety of mechanical and electrical engineering duties.

Candidates must be under 35 on 1 Jan., 1955, with extension for regular service in H.M. Forces and up to two years for permanent civil service. For the Post Office they must be at least 21, for the Ministry of Supply, and Ministry of Transport and Civil Aviation (Civil Aviation Organisation) at least 23; for other posts at least 25 on that date.

Generally a candidate must possess a University degree in Engineering or be a Corporate Member of one of the professional institutions—Mechanical Engineers, Electrical Engineers, or Civil Engineers or have passes in, or exemption from, Sections A or I and B or II of the corresponding Associate Membership examinations. Exceptionally, candidates of high professional attainment, but without the specified qualifications, may be admitted. For some posts Associate Fellowship of the Royal Aeronautical Society or an Honours degree in Physics or Engineering will be accepted.

London salary (Men) £675 (at age 25)/£1,035. Starting salary according to age up to £930 at 34. Candidates entering below age 25 will start at salaries varying from £472 at age 21 to £595 at age 24. Prospects of promotion. Salaries of next higher grades are £1,035/£1,355 and £1,410/£1,575. Somewhat lower in the provinces.

Women's scales lower but being improved under equal pay scheme.

Further particulars and application forms from Civil Service Commission, Scientific Branch, 30 Old Burlington St, London, W.1, quoting No. S85/55. Completed applications should be returned as soon as possible and in any case before 31 Dec., 1955 (V 152)

CENTRAL ELECTRICITY AUTHORITY
South Western Division
TECHNICAL STAFF VACANCIES

(*a*) SECOND ASSISTANT STATION CHEMIST, Feeder Rd/Bath Power Stations (based at Feeder Rd, Bristol). N.J.B., Class F, Grade 11, £595/£640.

(*b*) GENERAL ASSISTANT ENGINEERS, Technical Department, Bristol and Plymouth Regions.
N.J.B., Class AX/CX, Grade 7, £475 x £15—£550—£590.
Superannuation.

Applicants for (*a*) must have had training up to Higher National Certificate level in Chemistry, and experience in water and fuel analysis together with water treatment as applied to Power Station operation (Refer. AV/517).

For (*b*) should possess qualifications leading to A.M.I.E.E., and have served with one of the leading electrical manufacturers. They should have an interest in protective gear design and switchgear testing (Refer. AV/518).

Applications on Form A.E.6/ACT, obtainable from the Divisional Secretary, 26 Oakfield Rd, Bristol 8, should be completed and returned by 26 Sept., 1955. (V 149)

Box No. replies to be addressed to the ELECTRICAL TIMES, Sardinia House, Sardinia Street, London, W.C.2

CENTRAL ELECTRICITY AUTHORITY
London Division

APPLICATIONS are invited for the following superannuable posts. Conditions of service in accordance with N.J.B. Agreement, Schedule A. Salary includes London Allowance. Qualifications entitling to Graduate Membership of the I.E.E. or I.Mech.E. an advantage.

ASSISTANT ENGINEER (EFFICIENCY AND TESTING) ACTON LANE GENERATING STATION

Vacancy No. 55/682

Experience on plant testing and heat balance calculations desirable. Salary Class H, Grade 10, £750. 15s. p.a.

ASSISTANT ENGINEER (SHIFT) BARKING A AND B GENERATING STATION

Vacancy No. 55/683

Experience in the operation of E.H.T. switchgear, Station auxiliaries and the control of large Turbo-Alternators would be an advantage. The duties of the successful applicant will be those of Second Assistant to the Station Shift Control Engineer in charge of the Control Room. Salary Class L, Grade 14, £708. 15s. p.a.

ASSISTANT ENGINEER (OPERATION) BARKING C GENERATING STATION

Vacancy No. 55/684

Successful applicant will be required to carry out, under the Operation and Efficiency Engineer, investigations into plant performance, assist in statistical work, collect information for various returns, assist in drawing up new operating routines, compile operation sketches and information, and generally assist the Operation and Efficiency Engineer. Salary Class J, Grade 11, £750. 15s. p.a.

Applications, quoting vacancy number, may be made on form obtainable from Divisional Secretary, Central Electricity Authority, London Division, P.O. Box 136, Generation Hse, Great Portland St, W.1, and be received within 14 days of this advertisement. (V 135)

AUTOMATION

CONTROL ENGINEER required by a large chemical process manufacturing industry. Must be capable of advising on and developing instruments and controls necessary for automation, a knowledge of electronic computors desirable. Previous industrial experience essential. Salary £1,200/£1,500 depending on experience. Apply—Box No. 4801, Electrical Times. (V 156)

APPLICATIONS are invited by a firm in the North West for the position of a TRANSFORMER DESIGN ENGINEER. The work covers all types of distribution and medium power units. Applicants should hold a University Degree or H.N.C. in electrical engineering. A sound engineering training is essential for the position, which holds good prospects. Salary, depending on experience, in the order of £1,000 to £1,100 per annum. Full particulars, age, etc.—Box No. 4759, Electrical Times. (V 32)

ASSISTANT ENGINEER required for Overhead Line Contracts, Inverness Area. Good salary plus subsistence, if applicable. Apply: B. French Ltd., Pike Mills, Green St, Kidderminster. (V 48)

THE SUPERHEATER CO., LTD.
53 Haymarket, London, S.W.1

require ENGINEERS, preferably degree or H.N.C. standard for Power Plant Service Department. Previous experience not essential. The work is based on London but involves considerable travelling to sites throughout the country. Salary £600/£750 p.a., according to age, experience and qualifications. Apply in writing or telephone WHI. 8225, Ext. 12, for an interview and full details. (V 51p)

APPLICATIONS are invited for the following appointments in Saudi Arabia on the staff of the El Hassa National Electric Co. Single men preferred.

DISTRIBUTION ENGINEER

Must have a thorough knowledge of planning, constructing and maintaining overhead and underground distribution systems up to 11 kV including cable jointing, transformers, switchgear with discriminative protection and supplies to consumers. Fault location, control of labour and general organisation of the distribution and utilisation of electrical energy, with a knowledge of Regulations and records. Salary £200 per month.

POWER STATION SUPERINTENDENT AND ASSISTANT SUPERINTENDENT

Applicants required to control, operate and maintain diesel electric generating plant in units up to 1,500 horse power and be thoroughly familiar with engine water cooling problems. Must have had experience in the organisation, operation and management of this type of plant including high and low voltage switchgear and associated protective equipment. Duties will include keeping of records, and the supervision of repair workshops. A practical knowledge of the operation of machine tools is essential.

Applicants for the post of Superintendent should have held a position of Assistant Superintendent or equal in a diesel power station generating at high voltage.

Salary for Superintendent £180 per month, and for Assistant £120 per month.

Each of the above posts include free furnished accommodation, free medical attention, free transport, and air passages to and from United Kingdom.

Period of contract four years, with one month's United Kingdom leave on full salary for each completed year of service, but no leave outside country until two years' continuous service has been completed.

Applications to be submitted to Preece, Cardew and Rider, 8, 10 and 12 Queen Anne's Gate, Westminster, S.W.1, within a fortnight of the date of this advertisement. (V 167)

BRITISH THOMSON-HOUSTON COMPANY LIMITED has vacancies in its Research Laboratory at Rugby for PHYSICISTS and ELECTRICAL ENGINEERS for development work concerned with the evaluation and application of electrical insulating materials. Candidates appointed would work as members of a team which includes chemists and is engaged upon evolving, and devising realistic methods of assessing, improved insulation for machines and other electrical equipment. There are openings both for graduates and for those with Higher National Certificate. Applicants are invited to write to the Director of Research, British Thomson-Houston Co., Ltd., Rugby, stating age, qualifications and experience (if any) quoting the reference SR.1. (V 24)

CENTRAL ELECTRICITY AUTHORITY require two SENIOR ASSISTANT ENGINEERS (BOILER PLANT) in the Chief Engineer's Department, Bankside Hse, London, to conduct investigations into both the economic and design aspects of large future boiler plant installations for high pressures and temperatures and their major auxiliary equipment, with particular respect to combustion, stress and chemical engineering considerations. Candidates should preferably be Corporate Members of the I.Mech.E. or I.Chem.E. and have experience in the manufacture or design of boiler or chemical plant. Salary within Grade 1, N.J.B. £1,150/£1,500 p.a., inclusive. Applications on Form AE.6, obtainable from D. Moffat, Director of Establishments, Winsley St, W.1, should be completed and returned by 30 Sept. Quote Ref: AE/661. (V 137)

CROMPTON PARKINSON LTD., require both SENIOR and JUNIOR DRAUGHTSMEN at their Chelmsford Works. Applicants should have either Contract, Development, or Diagram experience on Switchgear up to 11 kV, although men with general Electrical or Mechanical experience will be considered. Ideal terms of employment. Apply giving full particulars to the Personnel Officer. (V 131)

CONSULTING Engineers require RESIDENT ENGINEER for service in Saudi Arabia, headquarters at Jeddah. Three years contract in first instance with prospects of permanency for suitable man. Applicants should be Corporate Members of Institution of Electrical Engineers, aged 35/40, of good personality, having thorough knowledge of overhead line and cable systems up to 33 kV, and with diesel engine installation and operating experience. Total emoluments £250/£300 per month according to qualifications and experience, free fully furnished flat having air conditioning plant, car provided including free running expenses while on duty. One month's visit to United Kingdom per annum with free air transport, including wife and up to two children, plus reasonable local leave. Free medical attention will be provided for engineer and family when in Saudi Arabia.

Applications should be submitted to Preece, Cardew and Rider, 8, 10 and 12 Queen Anne's Gate, Westminster, S.W.1, within a fortnight of the date of this advertisement. (V 112)

DESIGNER DRAUGHTSMAN for Powder Metallurgical Press Tools required. Apply giving full particulars of experience, age and salary required to: S. E. L. Ltd., Times Mill, Heywood, Lancs. (V 58)

DESIGNER required with experience of Distribution and Medium Power Transformers up to 5,000 kVA, 33 kV or over. Permanent and progressive position. Salary commensurate with experience and qualifications. Apply, in confidence to Chief Engineer, Transformers (Watford) Limited, Sandown Road, Watford, Herts. (V 28)

DRAUGHTSMEN required for medical equipment. Permanent and secure position, Pension Fund. Salary in accordance with age and experience. Write giving details. Quoting (Ref. STK/64). The General Electric Co., Ltd., Union Works, East Lane, North Wembley. (V 163)

ELECTRICAL ASSISTANT accustomed to electrical contracting installation work with administrative experience in interviewing clients, preparation of estimates and quotations, design and layout drawings for power and lighting installations for factories and emporiums. Candidates should have practical and supervisory experience with well-known electrical contractors, supported by technical education to HNC(E) level. Applications (which will be treated with strict confidence) should be made in writing to C.W.S. Engineering Department, Hanover St, Manchester 4, endorsed "Electrical Assistant," stating age, details of experience and salary required. (V 110)

EKCO-ENSIGN Electric Ltd., require experienced LIGHTING ENGINEER for Birmingham Office. Apply Senior Lighting Engineer, 45 Essex St, London, W.C.2. (V 125)

ENGINEER with varied rather than specialised electrical experience is required as editorial assistant with technical journal (London area). Candidates should possess a degree or H.N.C. Apply, giving full details of training, qualifications and experience, to—Box No. 4789, Electrical Times. (V 116)

ESTIMATING STAFF required, Male or Female. Write stating age, experience and salary required, to the Cable Makers Association, 52/54 High Holborn, London, W.C.1. (V 126)

EXPORT ASSISTANT required for the sales promotion of L.T. switchgear and allied products. Preference will be given to applicant possessing technical experience and knowledge of export routine. Permanent and progressive position, superannuation scheme, 5-day week. Apply stating age, education, experience and salary required to the Personnel Manager, Simplex Electric Co. Limited, Oldbury, Birmingham. (V 140)

IMPERIAL CHEMICAL INDUSTRIES LIMITED
Wilton Works

Assistant Technical Officer

DRAUGHTSMEN

Civil, Structural,
Mechanical, Instrument, Electrical,

Appointments to PERMANENT STAFF for the design and development of this Modern Factory on a 2,000 acre site.

Applicants should have the appropriate National Certificate and Drawing Office experience.

Wilton is situated in the North Riding of Yorkshire near the coast, has first class working conditions, five day working week, Pension Fund, Profit Sharing Scheme and excellent internal recreation facilities.

Out-of-pocket expenses are paid for applicants invited for interview, and after joining the staff married men will receive a refund of removal expenses up to £50, together with rail travel expenses. Schemes for assistance in housing are available, and for house purchase; facilities exist for loans and advances for legal charges.

Write for application form to Staff Manager, Imperial Chemical Industries Limited, Wilton Works, Middlesbrough, quoting reference I.C.I./X/250/h. (V 113p)

ELECTRICAL Contractors require an ESTIMATING and SUPERVISING ENGINEER immediately, particularly for screwed tube installation enquiries. Write stating full particulars. Apply Christy Bros. Limited, Chelmsford, Essex. (V 168)

ELECTRICAL DRAUGHTSMAN wanted for both diagram and layout work. Minimum qualifications, Ordinary National Certificate. Minimum age, 23. Salary according to age and experience. Contributory pension scheme and canteen facilities available. Write in confidence to: Resident Engineer, Bowater's Lloyd Pulp and Paper Mills Ltd., Kemsley Mill, Sittingbourne, Kent, marking envelope "Private and Confidential." (V 31)

ELECTRICAL ENGINEERS required by large firm of Consulting Engineers. Candidates must be up to O.N.C. standard and preferably H.N.C. Permanent post, staff pension scheme. Please reply giving details of previous experience to: Box 223, Glovers Advertising, 351 Oxford St, London, W.1. (V 42)

ELECTRICAL ENGINEER required for modern Tube Mill. Applicant should be of H.N.C. standard. Duties will include planning and supervision of installation of E.H.T. and L.T. distribution systems, installation of new mill drives, etc., and maintenance of existing production and processing plant. Preference will be given to applicants of 30 to 40 years of age. Apply to the Secretary, The Weldless Steel Tube Co., Ltd., Wednesfield, Staffs. (V 57)

ELECTRICAL ENGINEER/DRAUGHTSMEN required by Ashmore, Benson, Pease and Co., Stockton-on-Tees, for complete electrical installation, design, including motor application, control scheme engineering, distribution and cabling. Experience of contract work and estimating an advantage. Maximum assistance given in obtaining accommodation, one house and two flats already available. Pension Scheme, Technical Library and sports facilities available.

Apply stating age, experience, etc., quoting Ref. W, to Staff Personnel Officer. (V 18)

ELECTRICAL Contractors require MANAGER, Birmingham. Write with full particulars in strict confidence to—Box No. 4771, Electrical Times. (V 61)

EVERSHED AND VIGNOLES LTD., require a JUNIOR TECHNICAL SALES ASSISTANT for their Instruments Division, to deal with technical correspondence. Excellent opportunities and rapid advancement for the right man. Minimum qualifications O.N.C. Elec. Eng. or equivalent. Write to Instruments Manager, Acton Lane Works, London, W.4. (V 155)

ELECTRICAL ENGINEERS required by large Oil Company for service in Middle East initially for 18 months with good prospects of permanency. Should be suitably qualified and must have had experience in heavy industrial construction or maintenance. Bachelor preferred age limit 35. Good salary and allowances. Write giving details and quoting No. C.19 to Box No. 9018, c/o Charles Barker and Sons Ltd., 31 Budge Row, London, E.C.4. (V 154)

FIRST CLASS SENIOR DESIGN ENGINEER required for communications development in factory in London area. Four figure salary commensurate with experience which must be wide in telecommunications field, including electronics, supported by qualifications to H.N.C. standard. Pension scheme. A man with the necessary ability, initiative and vision could qualify for Technical Directorship. Own staff advised. Apply to Managing Director —Box No. 4787, Electrical Times. (V 115)

JOHNSON AND PHILLIPS LTD., have the following vacancies in their Transformer Department:

A TRANSFORMER DESIGNER with experience in all classes of Power Transformers.

A PRODUCTION ENGINEER with experience of modern planning methods.

Applications giving full particulars of age, training, experience and salary expected to Manager, Employment Department, Johnson and Phillips Ltd., Charlton, London, S.E.7. (V 139)

JUNIOR TRANSFORMER DESIGN ENGINEER required. Pension scheme and housing accommodation available. Write giving full particulars and salary required to Lindley Thompson Transformer Co., St. Mary's Rd, Langley, Slough. (V 138)

KEEN EDUCATED SALES ENGINEER operating from London Office, good electrical background, General Instrumentation, Temperature measurement and Control, some knowledge of electronics desirable, willing to travel essential. Applications giving particulars, age, experience and salary required to—Box No. 4799, Electrical Times. (V 141)

LARGE Electrical Manufacturers in Central London area require the services of a STREET LIGHTING ENGINEER, aged about 35. Must be conversant with all aspects of street lighting. This post offers considerable prospects. Commencing salary £750.—Box No. 4775, Electrical Times. (V 74)

LONDON E.W.F. Wholesaler invites applications to fill a new post offering considerable interest to a keen man. Applicants must have had experience in the electrical trade and give full particulars. Apply Manager—Box No. 4733, Electrical Times. (V 19)

LARGE Electrical Manufacturing Company in Central London area require the services of a JUNIOR STREET LIGHTING ENGINEER, aged about 28. This post offers considerable prospects to an ambitious young man. Knowledge of estimating and planning. Commencing salary £550.—Box No. 4777, Electrical Times. (V 75)

MANAGER for retail showrooms in North London area. Electrical appliances, light fittings, shades, radio and television. Excellent salary to hard worker having drive, initiative and able to organise staff. Give full details of age and experience.—Box No. 4795, Electrical Times. (V 127)

MANAGER required for radio and electrical departments in large showrooms. Must have had experience selling well-known makes of radio, television and electrical equipment. Good knowledge of stock-keeping and able to control staff. Salary would be not less than £1,000 per year to right applicant.—Box No. 4797, Electrical Times. (V 128)

POWER requirements increase when a great factory expands. That is why Ford Motor Company Limited of Dagenham, Essex, have new opportunities for draughtsmen with the right experience. Could you fill one of these vacancies?

(1) A MECHANICAL ENGINEERING DRAUGHTSMAN, with knowledge of Power Station work, High Pressure Boilers, Turbine and Ancillary Equipment and Layout. A man of H.N.C. standard.

(2) A SENIOR ELECTRICAL DRAUGHTSMAN, who can prepare drawings for the layout and cabling of Power House Equipment, Substation Layouts, Electrical Networks, Schematic Diagrams, etc. Capable of taking off quantities and preparations of specifications.

(3) A JUNIOR ELECTRICAL DRAUGHTSMAN who has already some experience of these duties.

These posts are permanent, and if you are one of the men we are seeking a generous non-contributory pension will follow a salary which has been increased according to your merit. Starting salary will be matched to your experience and qualifications. Are you interested? Then write to our Salaried Personnel Department, quoting reference AS/ND/2. (V 166)

There are vacancies in the Company's Research Laboratory at Rugby in a Group engaged on the development of semi-conductor devices and their associated circuitry. Requirements are for:

(i) QUALIFIED PHYSICISTS or ELECTRICAL ENGINEERS as Senior Development Engineers.

(ii) An ENGINEER to take charge of and organise small scale experimental production, in the Research Laboratory, of small electrical devices.

(iii) QUALIFIED ELECTRONIC CIRCUIT ENGINEERS for the exploratory development of transistor circuits.

(iv) LABORATORY ASSISTANTS with O.N.C. in Physics, Electrical Engineering or Chemistry. There will be staff appointments for suitable applicants.

Applicants are invited to write to the Director of Research, British Thomson-Houston Co., Ltd., Rugby, quoting reference HR. (V 25p)

BEDFORD

An opportunity arises for employment in this pleasant town on the River Ouse, with its varied social and recreational facilities.

W. H. ALLEN SONS AND CO., LTD., BEDFORD

require a

DRAUGHTSMAN

with experience in A.C. or D.C. motors and generators. This post holds good prospects, five-day week, contributory pension scheme. Excellent welfare and sports facilities.

Applications, giving age and experience should be made to the

Personnel Manager,
W. H. Allen Sons and Co., Ltd.,
Queens Engineering Works, Bedford.
(V 114p)

REPRESENTATIVE, resident London area, required for TEMCO Accessories. Preferably 25-30 with some experience on road or familiar with Electricity Board or wholesale trade, willing to spend part time away from home. Salary, commission, expenses, car provided. Pension Scheme. Apply in confidence stating age, experience, remuneration expected to—Mr S. M. Harris, T.M.C.-Harwell (Sales) Ltd., 37 Upper Berkeley St, London, W.1. (V 49)

SENIOR and JUNIOR ELECTRICAL and MECHANICAL DRAUGHTSMEN required for the Control Gear drawing office of the British Thomson-Houston Company, Melton Rd, Leicester. Applications are invited from men experienced in the design and detailing of control gear or of light electro-mechanical or mechanical apparatus. Please apply in writing to Manager, Drawing Offices, British Thomson-Houston Company, Ltd., Rugby. (V 77)

TECHNICAL SALES ENGINEERS required by Electrical Manufacturers in the Birmingham Area to prepare Estimates and deal with Contracts. Higher National Certificate preferred but not essential in all cases. Excellent prospects for Engineers with Sales initiative and ability to discuss problems with special customers. Write stating age, qualifications, experience and salary required to Box No. 4749, Electrical Times. (V 26)

OLIVETTI — ITALY

ING. C. OLIVETTI and C. S.p.A. of IVREA, ITALY, have vacancies at their research and development laboratories in Italy for QUALIFIED ENGINEERS with full experience in digital computers. Candidates, aged up to 40, must have a solid scientific and technical background and be keenly interested in all matters relating to electronic calculators. They should be capable of taking an active and creative part in the design of control units for data processing computers. In arriving at the starting salary, consideration will be given to experience in this specialised field and to previous career. Renewable two-year contracts are offered. Write, giving full details of education and previous experience, to the Personnel Manager, Ing. C. Olivetti and C. S.p.A., Ivrea, Italy. Replies should reach the advertiser not later than 30 Sept., and will be dealt with by 15 Oct. (V 52p)

STAFF-FOREMAN (Supervising) capable of taking charge installation and jointing on large Cable Contracts up to 33 kV including also aluminium sheathed cables. Superannuation scheme available. Applications, stating age, detailed experience and salary required to—Box No. 4773, Electrical Times. (V 73)

SENIOR and JUNIOR ELECTRICAL and MECHANICAL DRAUGHTSMEN required for the Electronics drawing office of the British Thomson-Houston Company, Blackbird Rd, Leicester. Please apply in writing to Manager, Drawing Offices, British Thomson-Houston Company Ltd., Rugby, giving details of age, experience, etc. (V 78)

TIME STUDY ENGINEER. Applications invited from men who have had at least two years' experience in applying incentives to direct and indirect workers, preferably in a process industry. Duties will include time and motion studying and investigation of existing methods and costs. The vacancy is permanent, superannuated, and is known within the Company, which is in the eastern suburbs of London. Applicants should give full details of experience, age and salary required, which will be treated in the strictest confidence.—Box No. 4791 Electrical Times. (V 117)

VARIOUS interesting posts exist in the laboratories of Metropolitan-Vickers Electrical Co., Ltd., working on the chemistry, metallurgy, and fundamental electrical properties of new semi-conducting compounds. Applicants with Degree, H.N.C. or advanced G.C.E. in appropriate subjects will be considered. Apply in writing, stating age, education, etc., marking envelope "Z.2," to: The Personnel Manager, Metropolitan-Vickers Electrical Co., Ltd., Trafford Park, Manchester 17. (V 23)

WE are extending our activities and invite applications from REPRESENTATIVES with experience of the wholesale electrical trade in London. Payment is by salary and commission with approved expenses.

Applications which will be treated as strictly confidential should be addressed to our Sales Manager, Mr A. R. Yates, E. Dawson (Lamp Factors) Limited, 10 Grays Inn Rd, London, W.C.1. (V 165)

APPOINTMENTS WANTED

NOW in Pakistan: BRITISH ELECTRICAL ENGINEER, 37, B.SC.(ENG.), A.M.I.E.E., experienced power station commissioning, estimating and supervision of switchgear and cable installation contracts. Shortly available.—Box No. 4519, Electrical Times. (V 17)

WANTED

WANTED ROTARY CONVERTERS, any size.—Universal, 221 City Rd, London, E.C.1. (V 2)

WANTED, for prompt cash, ferrous and non-ferrous SCRAP: also plant for dismantling. Buyers of secondhand machinery and plant for re-use.—W. and H. Cooper Ltd., 176 Brady St, Bethnal Green, E.1. (V 1)

WORK WANTED

ARMATURE REWINDING service to the trade. Vacuums, Drills, Grinders, Hood Dryers, Dental Motors. Vacuum Cleaner and Drill Armatures replaced from stock 24-hour service. Every job guaranteed. All Vacuum Cleaner parts, hoses, bearings, etc., in stock for any make. Complete overhauls our speciality, Regam Electric Cleaner Service, 95/99 Park Lane, Leeds 1. (V 4)

LET US SOLVE YOUR BREAKDOWN PROBLEMS, repairs speedily carried out by experts. Collection and Delivery by our own transport. A. T. Robinson, Electrical Power Engineers, The Green, Southall, Middx. Southall 3494/5/6. (V 5)

A.C. and D.C. MOTOR REWINDS and REPAIRS. Prompt service fully guaranteed. Edgware 5566 (4 lines).—Service Electric Co., Ltd., Stanmore, Middx (V 3)

BUSINESS OPPORTUNITIES

SPANISH firm wishes consult ENGINEER or TECHNICIAN competent to advise on the necessary machinery and processes for manufacturing micanite.—Box No. 4793, Electrical Times. (V 119)

EXTRUSIONS BY MARLEY

Buyers requiring rigid and flexible tubes and sections in thermoplastic materials should ask for a quotation from Marley Extrusions, Dept. 123, Lenham, Maidstone, Kent. Harrietsham 3818. (V 121p)

AGENCIES

M.A.A.—THE BADGE OF A GOOD MANUFACTURERS' AGENT. Manufacturers requiring reputable Agents are invited to communicate with the Secretary, The Manufacturers' Agents Association of Great Britain and Ireland (Inc.), Rosebery House, 8 Breams Buildings, London, E.C.4. Membership available to established agents only. Particulars supplied. (V 120)

PATENTS

IT is desired to secure the full commercial development in the United Kingdom of British Patent No. 726413 which relates to "Protective Battery Covers for Electric Torches and Flash Lights" either by way of the grant of licences or otherwise on terms acceptable to the Patentee. Interested parties desiring copies of the patent specifications should apply to Stevens, Langner, Parry and Rollinson, 5 to 9 Quality Court, Chancery Lane, London, W.C.2. (V 157)

FOR SALE

A.A. ELECTRICAL CO. for A.C.-D.C. MOTORS, switchgear, exhaust fans, hoists, reduction gears, new or reconditioned units.—Chi. 5105, 67 Rothschild Rd, W.4. (V 7)

A.C. and D.C. MOTORS, GENERATORS from stock.—Service Electric Co., Ltd., Honeypot Lane, Stanmore, Middx. Edgware 5566-9. (V 8)

A.C. and D.C. MOTORS, all sizes, large stocks. Fully guaranteed.—Milo Engineering Works Ltd., Milo Rd, East Dulwich, S.E.22. (Forest Hill 2278-9). (V 6)

A HIGH VACUUM IMPREGNATION UNIT or single or batch coil impregnation service to R.I.C. specification 214 or individual requirements.—Blickvac, Hamilton Rd Works, Hamilton Rd, S.E. 27. Tel. Gipsy Hill 4394. (V 12)

APPROX. 5,000 ft 1½ in. diameter screwed and socketed BLACK, unused, stock soiled, CONDUIT, at 1s. per ft or near offer to clear. Uniproducts (M/c) Ltd., 142 Bolton Rd, Pendleton, Salford 6. Telephone PENdleton 1341/3. (V 129)

continued on page 64

INDEX TO ADVERTISERS

Adcola Products Ltd. 16
Arrow Electric Switches Ltd. 3
Automat Co. 74

Belling & Co. Ltd. 6
Birmingham Aluminium Casting (1903) Co. Ltd. 33
Britannic Electric Cable & Construction Co. Ltd. 77
British Electric Resistance Co. Ltd. ... 76
British Insulated Callender's Cables Ltd. 21
British Thomson-Houston Co. Ltd. Cover (i), 19
Brush Electrical Engineering Co. Ltd. 17
Bryce Electric Construction Co. Ltd. 80

Cayson Electrics Ltd. 78
Central Electricity Authority 18
Chamberlain & Hookham Ltd. 69
Connollys (Blackley) Ltd. 15
Cooper & Co. (B'ham) Ltd. 66
Cox Walkers Ltd. 66
Cressall Manufacturing Co. Ltd. ... 4
Crompton Parkinson Ltd. ... 43, 71

Danfoss Manufacturing Co. 64
Dexion Ltd. 44, 45
Dixon-Lesley Ltd. 34
Dorman & Smith Ltd. 16

Eeto Insulations 16
Electric Construction Co. Ltd. ... Cover (ii)
Electrical Times Ltd. 67
Electro Dynamic Construction Co. Ltd. 14
Enfield Cables Ltd. 5
Engineering & Lighting Equipment Co. Ltd. 49
English Electric Co. Ltd. ... 25, 36
Ensel Electric Co. Ltd. 8, 72

Ferranti Ltd. 32
Fibreglass Ltd. 2
Firth-Vickers Stainless Steels Ltd. ... 4
Fry's Metal Foundries Ltd. 56

General Electric Co. Ltd. ... 47, 52
Genristo Ltd. 78
Grelco Ltd. 78
Gresham Transformers Ltd. 48

Hague & McKenzie Ltd. 74
Harboro' Rubber Co., Ltd. 76
Heddesco Ltd. 74
Henley's, W. T., Telegraph Works Co. Ltd. 12, 55
Higgs Motors Ltd. 10
Hurseal Ltd. 20

Igranic Electric Co., Ltd. 40
Imhof, Alfred, Ltd. 34
Isenthal & Co. Ltd. 68

Johnson & Phillips Ltd. 51

Klockner-Moeller Bonn 11

Lockers (Metal Perforators) Ltd. ... 38
London Electric Firm Ltd. 34
Low, Duncan, Ltd. 68
Lyons, Claude, Ltd. 7

McKechnie Bros. Ltd. 68
Martindale Electric Co. Ltd. 20
Mather & Platt Ltd. 72
Mersey Cable Works Ltd. 37
Metropolitan-Vickers Electrical Co. Ltd. 39
Metway Electrical Industries Ltd. ... 76
Midland Electric Manufacturing Co. Ltd. 54

Nalder Bros. & Thompson Ltd. ... 79
Nife Batteries 1

Panelec (Gt. Britain) Ltd. 12
Parmiter Hope & Sugden Ltd. ... Cover (iii)
Partridge Wilson & Co. Ltd. 65
Philips Electrical Ltd. 41
Pinchin, Johnson & Co. 42
Pitman, Sir Isaac, & Sons Ltd. 26
Plasticable Ltd. 76
Power Petroleum Co. Ltd. 23
Process Control Gear Ltd. 42
Purrmann & Herr G.m.b.H. 38
Purrmann, Max, K.-G. 38

Radiovisor Parent Ltd. 26
Reyrolle, A., & Co. Ltd. 50
Rowlands Electrical Accessories Ltd. ... 9

Sankey-Sheldon Ltd. 29
Sax, Julius, & Co. Ltd. 20
Scottish Cables Ltd. ... ... Cover (iv)
Siemens Electric Lamps & Supplies Ltd. 27
Simplex Electric Co. Ltd. 24
Simon-Carves Ltd. 46
Smiths Industrial Instruments Ltd. ... 31
South Wales Switchgear Ltd. 75
Spencer Wire Co. Ltd. 8
Steels Engineering Products Ltd. ... 22
Sturdy Electric Co. Ltd. 26
Sunvic Controls Ltd. 35
Symons, H. D., & Co. Ltd. 30

Thew, Edward H., Ltd. 78
T. M. C.-Harwell (Sales) Ltd. 30
Tucker, Geo., Eyelet Co. Ltd. 70
Tudor Accumulator Co. Ltd. 73

United Ebonite & Lorival Ltd. 53

Westool Ltd. 28
Wootton & Co. Ltd. 70

Yorkshire Switchgear & Eng. Co. Ltd. 13

continued from page 63

ELECTRIC MOTORS, D.C. and A.C., Motor Generator Sets, Alternators and Dynamos. Reconditioned and guaranteed, very large stocks held.
Britannia Manufacturing Co., Ltd., Britannia Walk, N.1. CLErkenwell 5512-3-4. Stores at Cobham, Surrey. (V 13)

FLUORESCENT SHELLS AND FITTINGS. Highest grade 5 ft Batten Shells with curved end covers from 9s. 6d. Lists of Shells and Fittings by return: Cowling and Holdsworth Limited, No. 1 Factory, Romside Trading Estate, North St, Romford. (V 15)

HOUSE SERVICE METERS, all types, can be obtained by return from Selectrics Dept. E.T., Castle Circus House, Torquay. Phone 7218. (V 14)

GENERATING PLANT 230 V D.C. for sale. 168 h.p. Vert. Diesel Engine driving a B.T.H. Generator. Complete plant with starting and cooling equipment. Control board, fuel tank. Illustration and details from F. J. Edwards Ltd., 359 Euston Rd, London. (V 169)

HOUSE-SERVICE METERS, a.c. or d.c., quarterly or prepayment.—Universal Electrical, 221 City Rd, London, E.C.1. (V 9)

MERCURY SWITCHES are made by Hall, Drysdale and Co., Ltd., of 58 Commerce Rd, Wood Green, London, N.22. Tel.: BOW 7221. (V 10)

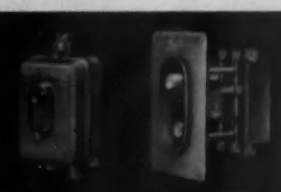
TIME SWITCHES from stock. Reconditioned or new. 12 months' guarantee. Lists from J. W. Hughes, 3 St. Thomas St, London Bridge, London, S.E.1. (Tel.: HOP 2759.) (V 16)

PURLEY CHOKES AND BALLASTS. Our 80-W tapped h.p.f. ballast with starter switchgear-holder incorporated is proving itself the most popular unit. Suitable for most fittings, 57s. 6d. each subject.—F. W. Blanshard Ltd. (Dept. E.T.), Purley, Surrey. Uplands 4818-9. (V 11)

MISCELLANEOUS

LEARN ELECTRICAL ENGINEERING the practical way. Our new self-study course includes equipment on which experimental work can be carried out. Also courses for all professional examinations. Free brochure from E.M.I. Institutes, Dept. ET.57, London, W.4. (Associated with H.M.V.) (V 122)

THE Danfoss TYPE 33
MANUAL DIRECT MOTOR STARTER



Vibration-resistant snap-action switch mechanism. Trip-free
Readily accessible clamp-type terminals
Seven relays cover the range from 0.2 to 15 amps
Double-break silver contacts. Ample screenings and spacings
Overload-trips in all three phases

Danfoss MANUFACTURING COMPANY
69, Victoria Street, London S.W.1 — Telephone: ABBey 3587

Photo by permission of Elkington & Co. Ltd.

. . . Power for Purification at Elkington & Co. Limited's works is provided by 18 Davenset Glass Bulb Mercury Arc Rectifiers with separate oil filled Transformers controlled by Automatic Stepless Voltage Regulators.

This installation is used for the electrolytic refining of copper from scrap, and is typical of installations involving continued processes where dependability is of paramount importance.

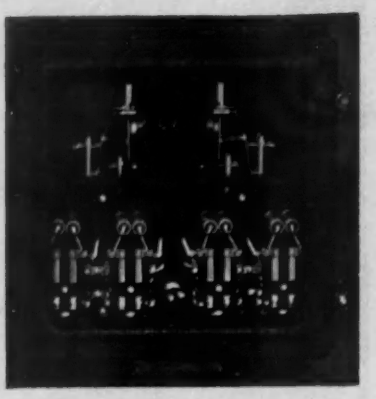
RECTIFIER INSTALLATIONS DAVENSET

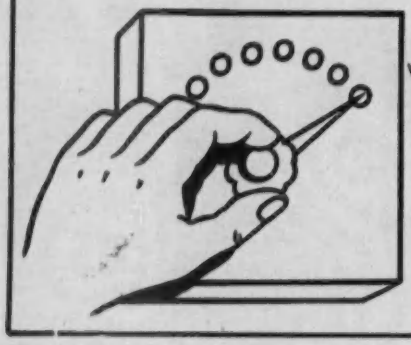
PARTRIDGE WILSON & CO. LTD., Davenset Electrical Works, Leicester

G

COXOHM AUTOMATIC VOLTAGE REGULATOR

- Suitable for large A.C. or D.C. machines.
- Possesses extreme sensitivity.
- Accurate to within ± 1%.
- Full balancing gives stability under mobile conditions.
- Simple to install and to put into operation.
- Maintenance negligible.





As specialists in the field we shall be pleased to advise on the question of automatic voltage regulation if we may receive particulars of your specific requirements for any loading

COX WALKERS LTD.

NORTH EASTERN ELECTRIC WORKS

Established 1880 **DARLINGTON** *Phone 2387*

Literally—a hairsbreadth

Today, most progressive engineers think of Coopers Felt as an engineering material, yet many do not know that it can be machined to close limits. With the harder felts we can work to within a hairsbreadth of your specification. Yes, we mean that literally—to the breadth of a human hair. One of Cooper's technical advisers will be happy to tell you more about this versatile material.

COOPERS FELT

COOPER & CO. (B'HAM) LTD.,
BRYNMAWR BRECONSHIRE

Tel.: Brynmawr 312 Telegrams: Polting Brynmawr.

Registered Office and Works:
LITTLE KING STREET, BIRMINGHAM, 19.

Now Available

the NEW wallchart based on the

HOLGER NIELSEN

METHOD

of treatment for apparent death from

ELECTRIC SHOCK

Instructions prepared by

Dr. P. Pringle, LL.B., B.Sc. (Econ.), M.R.C.S., L.R.C.P., D.I.H.

On card size 19¼″ × 12″ printed red and black with *special high quality finish*, eyeletted and corded.

PRICE 2/6 plus postage.

Mounted on metal size 19¼″ × 12″ printed red and black, varnished, eyeletted and corded.

PRICE 5/- plus postage.

Published by

THE ELECTRICAL TIMES LTD.

Sardinia House . Sardinia Street . London, W.C.2

HOLborn 6016

For highest speed with absolute precision—specify

No. 4 Turning and Screwing Brass Rods

Ever higher speeds demand ever greater precision—and British industry needs both if production is to be increased and costs reduced. McKechnie Brothers have developed a range of standard high-speed turning and screwing rods, including the popular **No. 4** and **YS,** all of which are guaranteed to combine the correct alloy and temper for maximum machine speeds and longest tool life. For full details of these and other MKB free machining rods please write to—

McKECHNIE

BROTHERS LIMITED

14, BERKELEY ST., LONDON, W.1. Phone: HYDe Park 9941/7

Metal Works: Rotton Park Street, Birmingham, 16.
Other Factories: Widnes, London, South Africa, New Zealand.
Branch Offices: London, Leeds, Manchester, Newcastle-on-Tyne, Gloucester, Paris.

The Test of Time

'Dunlow' Electric Liquid Heating equipment and materials have over the past 25 years proved their efficiency and reliability. Pioneers in Electric Water Heating, Duncan Low Ltd. now supply a comprehensive range of Water, Oil and Acid Electric Heating equipment meeting the varied needs of Domestic, Agricultural and Industrial users.

They are pleased to offer their co-operation in the design of equipment to suit special and individual requirements.

DUNCAN LOW LTD

293 BELL STREET · GLASGOW C.4

VERSATILE AUTOMATIC REGULATOR

Power, Voltage, Current, Power Factor, Speed, Mechanical Pressure, Temperature, Volume and Weight.

Any of these can be automatically controlled by the Isenthal Automatic Regulator type "NC"—probably the most versatile regulator ever made. It can be used with A.C. or D.C. generators and motors of the heaviest types.
It is extremely robust in construction making use of a servo control motor in conjunction with oil under pressure. All moving parts are lubricated with oil under high pressure in a circulatory system, thus ensuring a minimum of wear. "Hunting" is eliminated by means of a back-coupling system.
The "NC" Regulator is simple to operate and adjust, and requires the minimum of maintenance.

Send for illustrated descriptive leaflet

ISENTHAL

Isenthal & Co. Ltd., Ducon Works, Victoria Rd. North Acton, London, W.3. Tel: ACOrn 3904. Telegrams: Isenthal, London.

15. 10A

CHAMBERLAIN AND HOOKHAM

PEAK LOAD SUPERVISOR

FOR THE SUPERVISORY CONTROL & LIMITATION OF MAXIMUM DEMAND

This will save you money

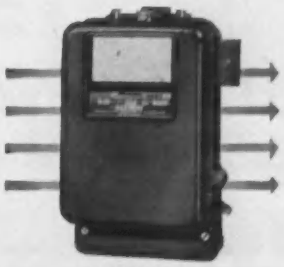
LOAD SUPERVISOR

- ★ The Supervisor can be installed in any convenient position for control away from the mains supply
- ★ Visible and audible warnings are given before a predetermined target load is exceeded
- ★ Warnings are repeated at five minute intervals until the load is reduced
- ★ The percentage of load to be shed is given on warning
- ★ The period of excess load is automatically recorded

SEND FOR CATALOGUE SECTION 3402

Chamberlain AND Hookham

CHAMBERLAIN & HOOKHAM LTD., BIRMINGHAM



TRANSMITTER

In the words of Shakespeare :-

"Thou art in a parlous state"

"As You Like It" Acts III, Scene II.

We may not have the courtly wit of Touchstone, but we have wit enough to know that if you are not using the "POP" Riveting System then you are, indeed, in a parlous state. This modern and most efficient of riveting systems increases production, reduces labour costs and enables riveting to be done in one operation, by one operator, from one side of the material only.

Our technicians are experts at solving riveting problems—let them advise you.

"POP" RIVETING
ONE OPERATOR OPERATION

Geo. TUCKER EYELET Co. Ltd.
Walsall Road **BIRMINGHAM 22**
Telephone: BIRchfields 5024 (7 lines) Telegrams: EYELETS, BIRMINGHAM
Consultants and Tool Manufacturers:
AIRCRAFT MATERIALS LTD. Midland Road, London, N.W.1

"POP" is a regd. Trade Mark of Geo. Tucker Eyelet Co. Ltd.

THE MODERN SYSTEM OF RIVETING

SPECIALISTS FOR OVER 30 YEARS

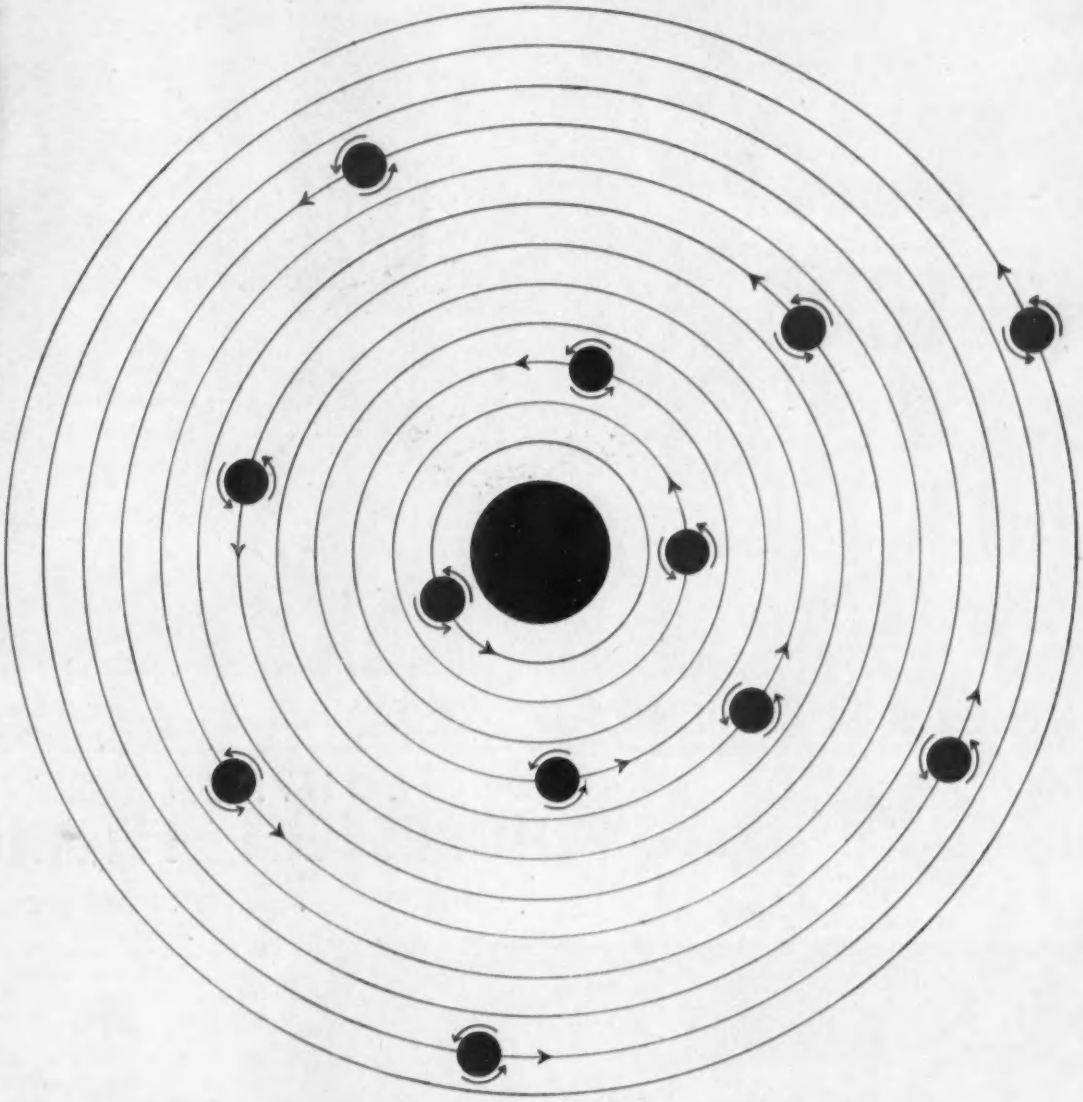
METER BOARDS
SWITCH BLOCKS
SWITCH BOXES
ELECTRICAL WOODWORK

FIRST CLASS WORK · QUICK DELIVERY · COMPETITIVE PRICES

WOOTTON & CO. LTD

ALMA WORKS, PONDERS END · MIDDLESEX · TELEPHONE: HOWARD 1858

Do planets perplex?



They needn't. The Crompton Parkinson system provides a very down-to-earth demonstration of the principle on which they work. At Crompton Parkinson there are twelve self-contained sections, each with its specialised outlook and developing in its particular field. Each, like a planet, revolves on its own axis, concerning itself with an individual aspect of electrical application. But these Crompton planets are all part of a single system. Between them flows a constant interchange of ideas. They work closely together—independent yet interdependent. The result? An electrical service ready to meet the needs of industry throughout the world.

When it comes to electrical equipment . . .

You've got to hand it to Crompton Parkinson LIMITED

ELECTRICAL EQUIPMENT

MAKERS OF ELECTRIC MOTORS OF ALL KINDS · ALTERNATORS AND GENERATORS · SWITCHGEAR · B.E.T. TRANSFORMERS · CABLES INSTRUMENTS · LAMPS · LIGHTING EQUIPMENT · BATTERIES · STUD WELDING EQUIPMENT · TRACTION EQUIPMENT · CEILING FANS

CROMPTON PARKINSON LTD · CROMPTON HOUSE · ALDWYCH · LONDON · WC2 · TELEPHONE: CHANCERY 3333

453

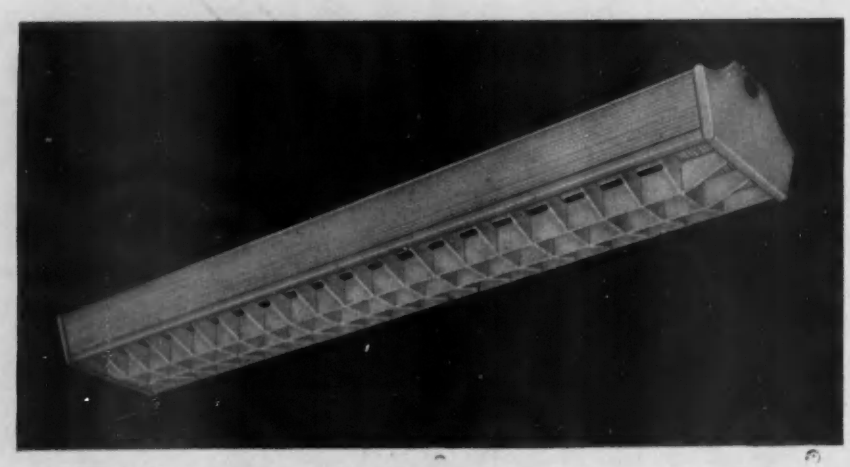
PROTECTED by MULSIFYRE

Turbo-alternators at Croydon Power Station, C.E.A., with "Mulsifyre" equipment providing protection against fire in the oil of the lubricating system.

MATHER & PLATT LIMITED PARK WORKS · MANCHESTER 10 PARK HOUSE · 22 GT. SMITH ST · LONDON SWI

THE *Eterna* LOUVRED FLUORESCENT FITTING

. . . introduced



for special use in stores, offices and showrooms is also suitable for industrial applications where appearance is equally important.

● In addition to the standard finish of hard gloss white, ETERNA Louvred Fittings are available in various colours and in the following sizes:—

4 ft. for TWIN 40 Watt Lamps
5 ft. „ „ 80 „ „
5 ft. „ THREE 80 „ „
5 ft. „ FOUR 80 „ „

● All ETERNA Louvred Fittings incorporate our well known Grade "A" H.P.F. Control Gear completely enclosed in chassis for dust exclusion. Side panels are of luminous glass removable for easy cleaning and lamp replacement. Provision is made for chain or conduit suspension.

● Other ETERNA models available. Also full range of Fluorescent Control Gear and Accessories.

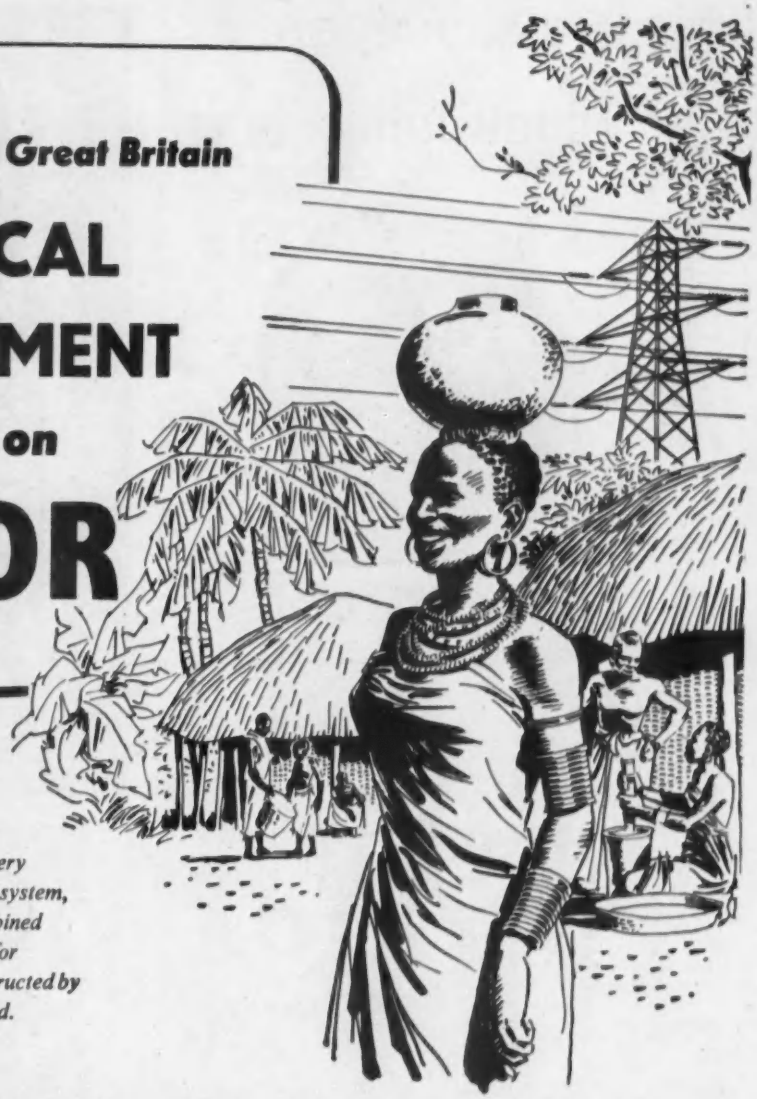
ENSEL ELECTRIC CO. LTD.

218-219 Upper Street, London, N.1 *Phone: CANonbury 2251/2*

ILLUSTRATED BROADSHEET FOR THIS AND OTHER 'ETERNA' FITTINGS AVAILABLE ON REQUEST.

In East Africa as in Great Britain

ELECTRICAL DEVELOPMENT depends on TUDOR



The East African Power and Lighting Company Limited have incorporated a number of Tudor Battery equipments in their electricity supply system, including a 110-volt battery and combined charging rectifier/D.C. switchboard for Wanjii Power Station, recently constructed by Balfour, Beatty and Company Limited.

FOR OVER FIFTY YEARS The Tudor Accumulator Company has specialised in the design and manufacture of batteries for switchgear operation, indication and emergency duties in power stations and substations; and Tudor Batteries have played a large part in the recent expansion of electricity supply in Britain. Wherever they are in service, Tudor Batteries are noted for their outstanding reliability and low maintenance cost under all conditions.

Tudor engineers will be pleased to prepare a specification of the most economical battery scheme to meet your requirements. There are Tudor agents in most parts of the world.

Tudor BATTERIES

T.120

THE TUDOR ACCUMULATOR COMPANY LIMITED · 137 VICTORIA STREET · LONDON · SW1

This is a saucepan.

I look funny in it

My Daddy (whom you can't see because he is taking a photograph of me) says that people who sell saucepans must be fed up with reading advertisements about saucepans.

He says that they know which are the best by their feel, their look, their price, and the way they sell.

He says that these particular saucepans have a wonderful reputation.

I can't see a reputation. Only a sort of stamp on the side like this:

HAGUE & McKENZIE LTD PYRAMID WORKS, BIRMINGHAM

a Positive

BRIDGE TO

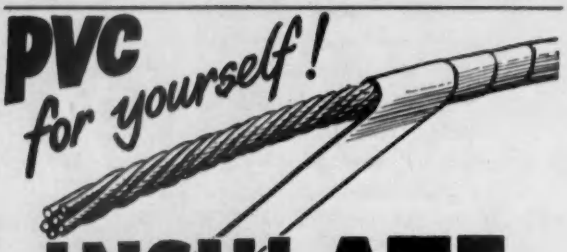
Reliability

SELENIUM METAL RECTIFIERS

AUTOMAT CO. 366 MOORSIDE ROAD, SWINTON, NEAR MANCHESTER. TELEPHONE: SWINTON 2765.

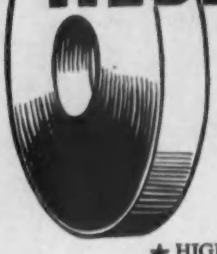
CW 3157

PVC *for yourself!*



INSULATE *with*

HEDDOTAPE



The new P.V.C. Self-adhesive insulating tape available in 6 colours in widths of ½" upwards.

★ ONE layer equals many of old-fashioned black cotton tape.
★ GREAT dielectric strength (10,000 volts) yet wafer thin.
★ HIGH resistance to oils, acids, moisture and corrosion.
★ HIGH adhesive strength provides perfect insulating seal even under extreme temperatures.
★ HIGH elasticity conforms to all surfaces.
★ SMOOTH plastic surface gives perfect finish.

HEDDOTAPE is a product of the Heddon-Smith Group of Companies

Manufactured by

HEDDESCO LTD.

Heddonia House, 374, Euston Road, London, N.W.1

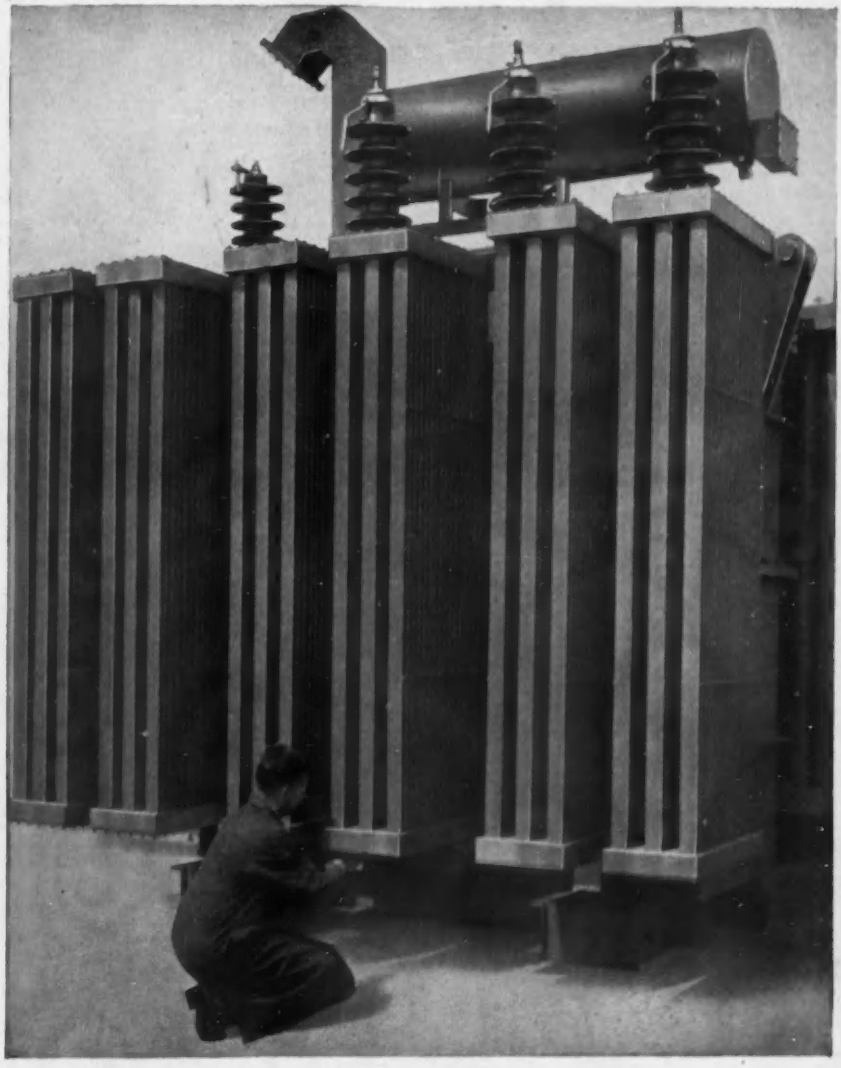
DHB/2172 *EUSton 8501 (6 lines)*

SWS

POWER
TRANSFORMERS

Power and Distribution Transformers in all ranges up to 5,000 kVA. and 66,000 volts are manufactured at the Treforest factory.

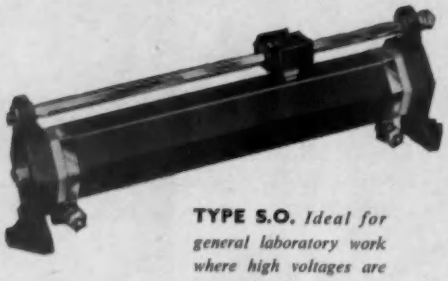
The Illustration shows a 66,000 volt 2,500kVA transformer supplied to Pakistan.



SOUTH WALES SWITCHGEAR LIMITED

BLACKWOOD · MONMOUTHSHIRE

BERCO



TYPE S.O. *Ideal for general laboratory work where high voltages are not employed.*

Sliding Resistances

EMBODY 30 YEARS' EXPERIENCE IN THE MANUFACTURE OF CONTROL EQUIPMENT

BERCO Sliding Resistances are widely employed in Laboratory research, industry and all types of electronic work. Smooth action is ensured by the copper graphite self lubricating brush mechanism. Hexagonal tube ensures rigidity and great mechanical strength. A very wide range of resistances for all applications is available, and we are now able to offer greatly improved delivery.

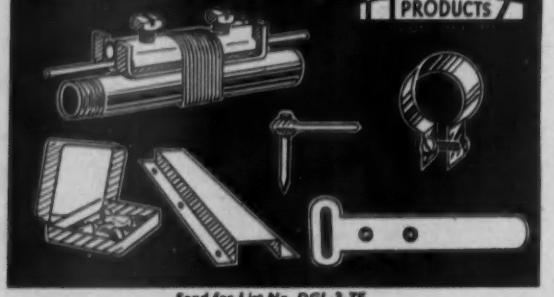
TYPE S.E. *Suitable for dimming lamps, speed control of motors, etc. This model can be mounted on machines operated by unskilled workers on account of the complete protection given by the cover.*

THE BRITISH ELECTRIC RESISTANCE CO. LTD.

Queensway, Ponders End, Middlesex. Telephone: Howard 1492. Telegrams: Vitrohm, Enfield.

BR1281-AH

WIRING ACCESSORIES METWAY PRODUCTS



Send for List No. DGL/3/TE

METWAY WORKS · KEMP TOWN · BRIGHTON 7

INSULATING SLEEVINGS . . .

P.V.C. and POLYTHENE SLEEVINGS INSULATED WIRES and FLEXIBLES

An aircraft's performance . . . your car's reliability . . . tonight's Television and Radio's sound may depend upon efficient electrical insulation.

A.I.D. AND A.R.B. APPROVED

PLASTICABLE LIMITED

HAWLEY LANE - FARNBOROUGH - HANTS

PHONE: FARNBOROUGH, HANTS 85

MOULDED RUBBERS

61 YEARS' EXPERIENCE

Dainite

Consult our Technical Staff

THE HARBORO' RUBBER CO., LTD.
Market Harborough Tel.: 2274-5

WE HAVE JOINED FORCES . . .

Britannic Cables Ltd

and

General Cable Manufacturing Co Ltd

have joined forces to work as an integrated group, pooling all their resources of plant, experience and manufacturing skill.

The combination of BRITANNIC'S specialised knowledge of paper insulations and G.C.M.'S long experience with plastic and rubber insulations enables the new group to offer now a *complete* service to cable users in any part of the world. Whatever need arises in the continually-widening development of electrical supply—whether for cables of standard specification or for specialised industrial types — the group can now supply it.

The associated companies were *independent* companies. The new group is an *independent* group, with all the advantages this spells for its customers in prompt service and flexible price arrangements. Prove these advantages in any cable problems now confronting you.

BRITANNIC CABLES LTD · IVER · BUCKS

GENERAL CABLE MANUFACTURING CO LTD · LEATHERHEAD · SURREY

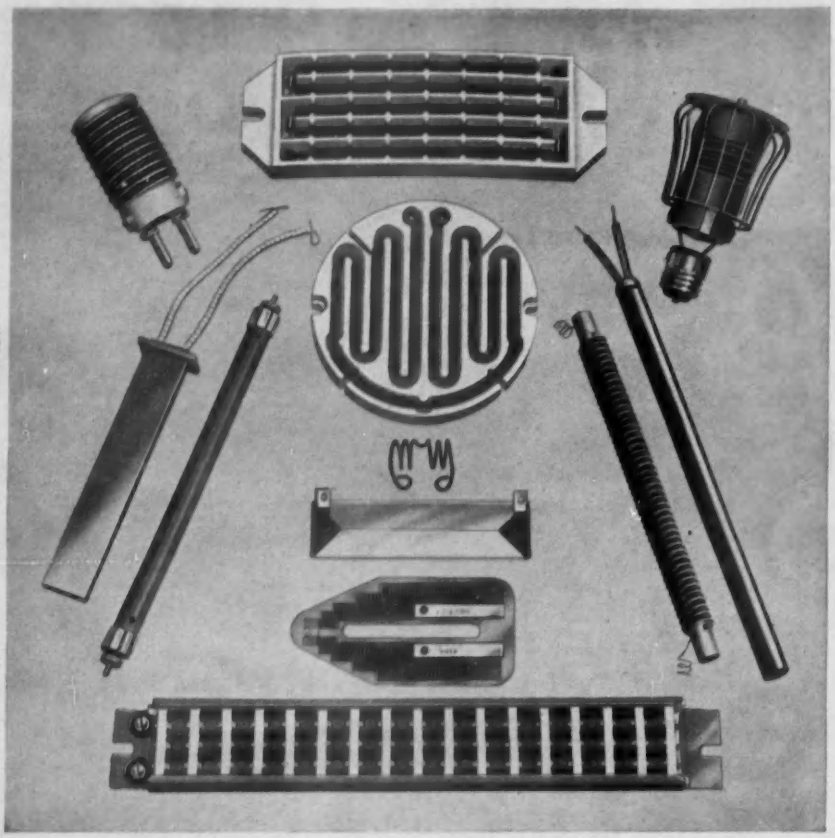
ELECTRICAL ELEMENTS *for* ALL PURPOSES

New price list now available. Please write, or Telephone Nottingham 52148

GENRISTO

LTD.

OSMASTON STREET
NOTTINGHAM



Grelco

LIMITED

TERMINAL BLOCKS

Full particulars from:
GRELCO WORKS, MINEHEAD, SOMERSET

Telephone :
MINEHEAD 740

RECTIFIERS

WITH METAL RECTIFICATION

For—
BATTERY CHARGING, ENGINE STARTING, LIFT CONTROL, SIGNALS, COMMUNICATIONS, LABORATORIES, etc.
WE SHALL BE GLAD TO QUOTE FOR EQUIPMENT MADE TO SUIT YOUR OWN PARTICULAR PURPOSE
PROMPT DELIVERY

CAYSON

CAYSON ELECTRICS LTD
QUEENS RD. WATFORD
Tel: WATFORD 7156 & 7177

INDUSTRIAL PLATES FOR EVERY PURPOSE!

We are not wizards but nearly a century of experience in the manufacture of engraved plates of all kinds for all purposes and in all languages, ensures craftsmanship of which we are justly proud.

Our products-in plastics, engraved ivorine, enamelled bronze, cast aluminium, brass, etc., are supplied to all the leading industrial and shipbuilding companies in the country and we are on the Admiralty List.

Designs will be submitted on request for reproduction in large or small quantities.
Let us know your requirements which will receive instant attention.

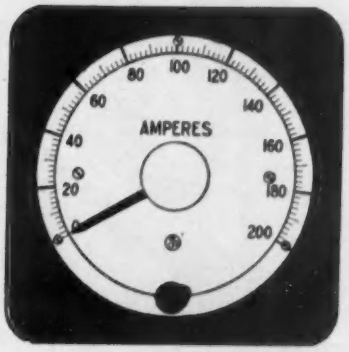
EDWARD H. THEW LTD.

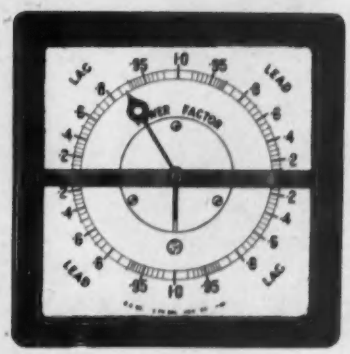
The Empire's Largest General Engravers

12 FIRST AVENUE,
TEAM VALLEY TRADING ESTATE
GATESHEAD-ON-TYNE 11

Telephone: LOWFELL 75667 Grams: "Engraving Gateshead-on-Tyne"

NALDERS





INSTRUMENTS

OF MANY DIFFERENT TYPES

Nalders manufacture a wide range of Electrical Measuring Instruments—indicating, recording, switchboard, portable—high quality being characteristic of every type. All instruments conform to B.S.S.89, cases being of Rectangular, Square, or Round pattern in diecast aluminium or pressed steel, finished bright black stove enamel or other colour to customers' requirements.

N.C.S. PRODUCTS include also: Protective Relays, Vectormeters, Automatic Earth Proving Supply Switches, "Bijou" Circuit Breakers, etc.

We can meet your demands

for

PROMPT DELIVERY

NALDER BROS. & THOMPSON LTD.

DALSTON LANE WORKS . LONDON . E.8

TELEGRAMS: OCCLUDE : HACK : LONDON

TELEPHONE: CLISSOLD 2365 (3 LINES)

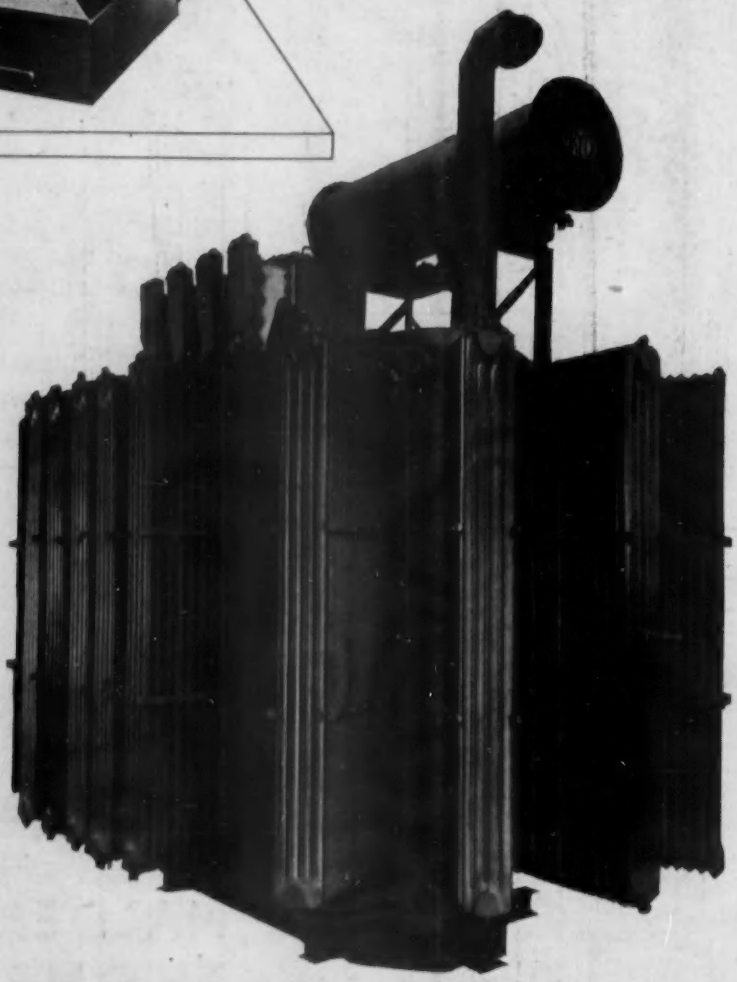
... and remember the transformer must be BRYCE

DURING the life of a transformer it is certain to be subjected to severe service conditions. It is then that the liberal design and superior workmanship of the Bryce transformer prove their worth.

Be sure to consult Bryce before ordering Power Transformers.

Illustrated is a 7500 kVA, 31500/6600 volt, 3 phase, 50 cycles transformer.

Larger transformers can be built up to 15000 kVA at 132 kV.



BRYCE

BRYCE ELECTRIC CONSTRUCTION COMPANY LTD.

KELVIN WORKS • HACKBRIDGE • SURREY

WALLINGTON 2601-4

In association with HACKBRIDGE CABLE COMPANY LTD.

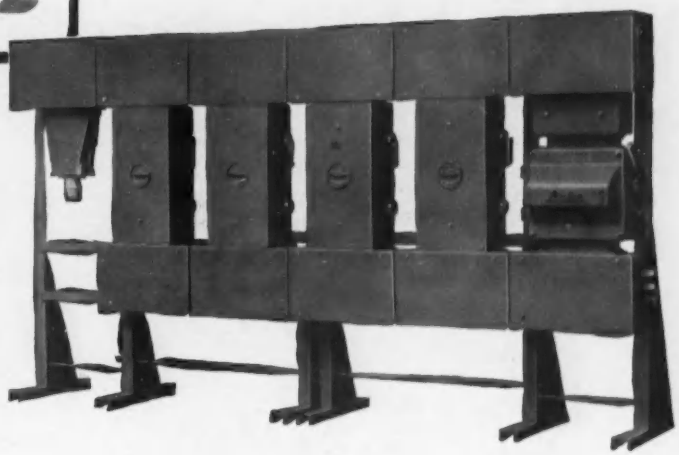
T2.

Printed in England by Staples Printers Limited at their Great Titchfield Street, London, establishment, for the Proprietors, THE ELECTRICAL TIMES LTD., and published at Sardinia House, Sardinia Street, London, W.C.2.

Industrial Energy Distribution—through

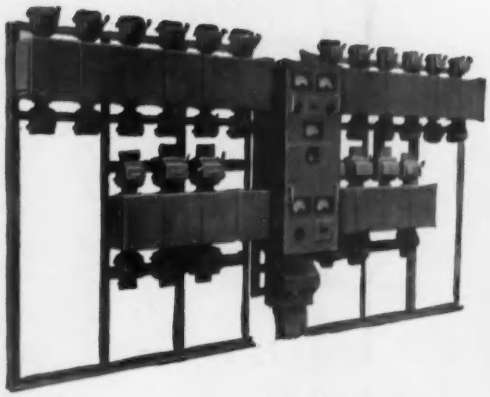
Aeroflex
HOPE'S PATENTS

Three examples of Aeroflex Unit type switchboards, each an efficient factor in the distribution of energy in a large industrial organisation.



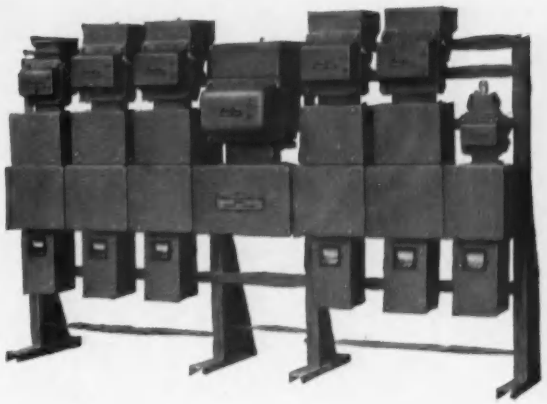
Change-over switchboard arranged so that any of the four outgoing circuits can be switched to either side of the busbars. Supplied through the British Thomson-Houston Co. Ltd., (London) to the British Sugar Corporation at Peterborough.

UNIT TYPE SWITCHBOARDS



Unit type switchboard supplied to Ericsson Telephones Ltd., Beeston, Nottinghamshire.

Switchboard supplied through B. French Ltd., and installed at the Carrickfergus, Co. Antrim plant of Courtaulds Ltd.

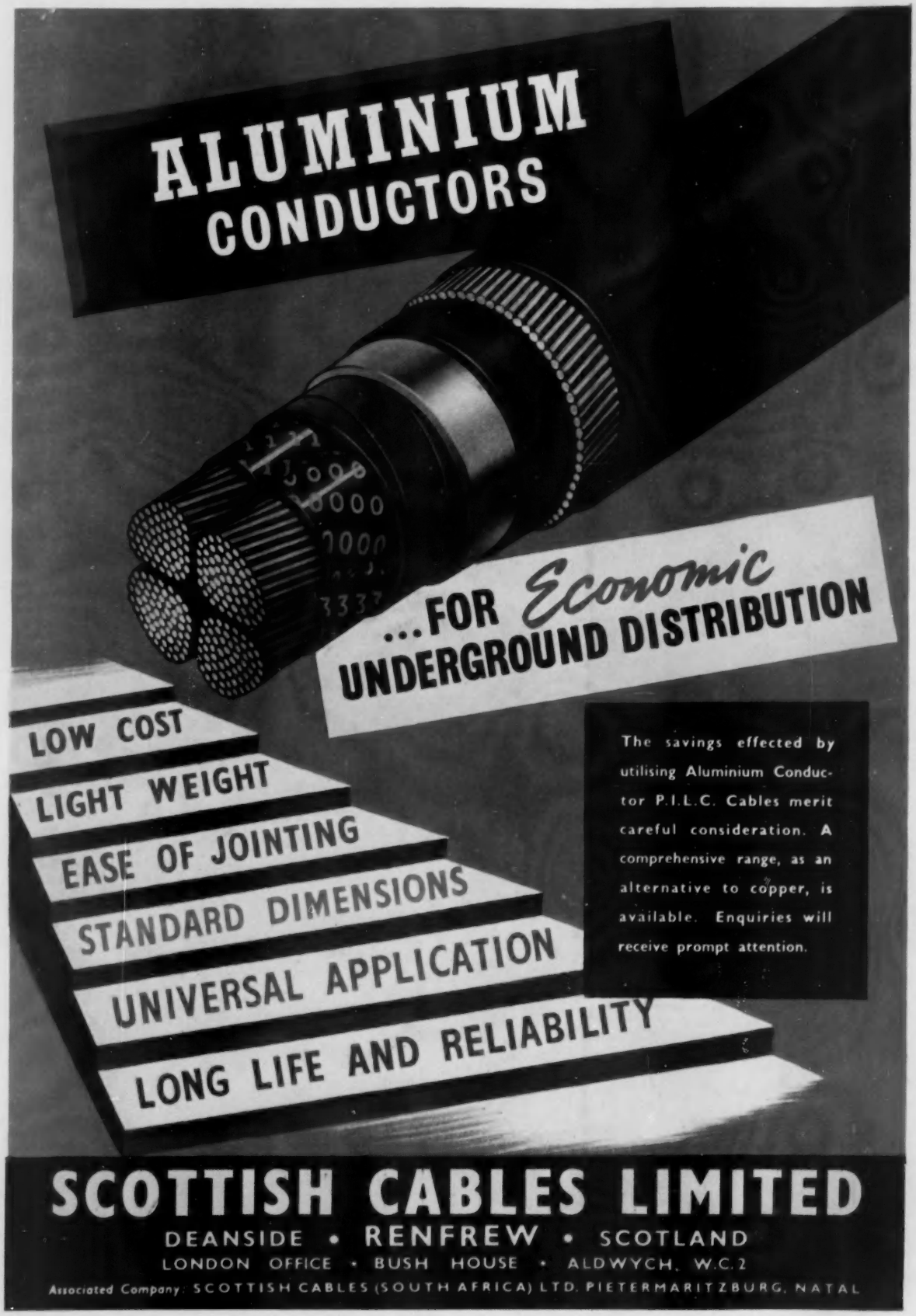


Descriptive literature available on request

PARMITER HOPE & SUGDEN LIMITED · MANCHESTER 12

London: 34 Victoria Street, S.W.1 *Glasgow: 5 Somerset Place, C.3* *Birmingham: 39/41 Carrs Lane, 4*

dm PH84


ALUMINIUM
CONDUCTORS
...FOR Economic
UNDERGROUND DISTRIBUTION
LOW COST
LIGHT WEIGHT
EASE OF JOINTING
STANDARD DIMENSIONS
UNIVERSAL APPLICATION
LONG LIFE AND RELIABILITY
The savings effected by utilising Aluminium Conductor P.I.L.C. Cables merit careful consideration. A comprehensive range, as an alternative to copper, is available. Enquiries will receive prompt attention.
SCOTTISH CABLES LIMITED
DEANSIDE • RENFREW • SCOTLAND
LONDON OFFICE • BUSH HOUSE • ALDWYCH, W.C.2
Associated Company: SCOTTISH CABLES (SOUTH AFRICA) LTD. PIETERMARITZBURG, NATAL